THE REGION OF EAST GIPPSLAND

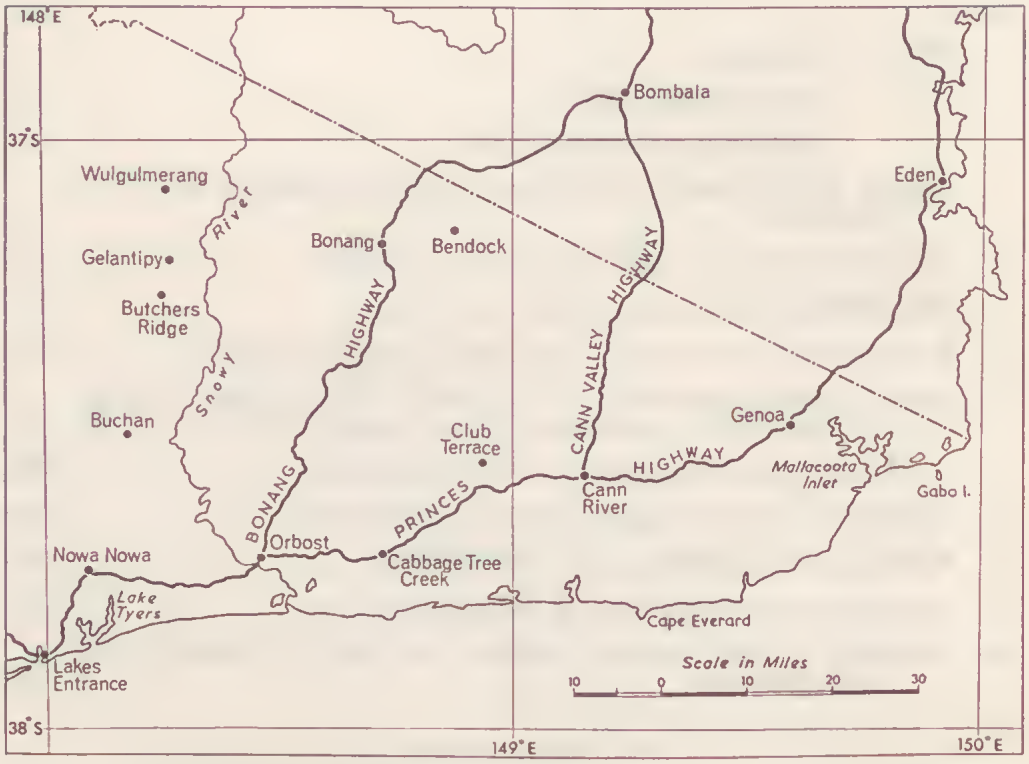

FIG. 1—The region of East Gippsland, as defined for purposes of the Symposium, extends E. from the 148th parallel, and from the Victorian border (diagonal broken line) to the sea. (Sketch map prepared by Mr H. J. Collier of the Geography Department, University of Melbourne.)

EAST GIPPSLAND SYMPOSIUM
14 SEPTEMBER, 1967

FOREWORD

A one-day symposium on East Gippsland was held on 14 September 1967. The region is defined for the purpose of the symposium as lying east of the 148th parallel and between the main Divide and the sea; the accompanying Figure shows the area and major towns. It is a distinctive region in its climate and ecology, having more generous summer rain than other parts of the State; it is also little known and little developed by man as compared with other parts. The object of the symposium was to bring together the many kinds of scientific information available on this region and to stimulate further research through discussion. The symposium was organized along the lines of three previous symposia, namely those on the High Plains of Victoria, on the basalt plains of Western Victoria, and on the Victorian Mallee, published respectively in volumes 75, 77, and 79 of the Proceedings.

The Council of the Society has decided to publish this Symposium as a separate Part since it will have its own interest and attraction beyond the membership of the Society.

G.W.L.

ALFRED WILLIAM HOWITT

By courtesy of the Victorian Department of Mines, sketches of Gippsland by Alfred William Howitt are used in this number of the Proceedings. These particular drawings were used to illustrate his classic paper, 'Notes on the Devonian Rocks of North Gippsland' (1876). Though slight, they are quite charming, and an apposite supplement to the Symposium on East Gippsland. Howitt is of particular interest to the Royal Society of Victoria not only because of his contributions to the geology, botany and anthropology of the particular area covered by this Symposium, but also because of his long personal association with the Society itself.

He was born in Nottingham, England, 1830 and died at Metung, Victoria, 1908. Both his parents were distinguished writers who numbered amongst their friends Charles Dickens, the Brownings, Hans Christian Andersen, Tennyson, the Rosettis. Howitt's literary heritage is apparent in the vivid wording of his own extensive writing. With his father and a brother, he migrated to Victoria in the gold-rush of 1852. Their search for gold was unsuccessful, but Howitt stayed on in Australia after his relatives left in 1854, and in the next few years had various occupations. He was a very intelligent man, educated in Germany as well as in England, and the space of Australia, so little explored, challenged him. He became an extremely skilled bushman. 'I am naturally a savage and must have open air and forests which are necessary to my existence', he wrote in a letter home, ex-

Mt. Tambo from the Omeo station. (*A. W. Howitt, 1876.*)

plaining why he did not wish to return. 'I have a great hankering after tent life.'

Subsequently, he was a member of an expedition led by Blandowski of the Melbourne Museum to explore the Mornington Peninsula. He worked on a cattle station at Cape Schanck, on a small farm at Caulfield, managed a sheep station at Thalia Plains, and from there explored north into South Australia to assess the nature of the country for pastoral use. Partly because of this experience of the terrain, but also because of his outstanding qualities as leader, explorer and bushman, he was chosen, 1861, by the Royal Society of Victoria to lead the Burke and Wills Relief Expedition to the Centre. His own account of this journey was vividly presented, many years later, in his Presidential Address to the Australian Association for the Advancement of Science, Adelaide, 1907.

From Burke's 60th. camp we followed the course of Cooper's Creek, passing his first depot and then coming to his second depot, Fort Wills. . . The country we crossed consisted in great part of earthy plains, cracked and fissured in all directions, and often without any trace of vegetation; while in other places the dried stalks of plants, higher than a horse, showed what the country would be like after floods . . .

I turned towards the river, and came to it near the lower end of a very large sheet of water, and where I saw, on the opposite side of the dry channel, a number of native huts. . . (My) blackboys . . . rode toward me. As we met the elder one said, "Find em whitefella; two fella dead boy and one fella livo." Hastening on and crossing over to the native camp, I found John King sitting in one of the native wurleys. He was a melancholy object, and hardly to be distinguished as a civilized being by the remnants of the clothes on him. He was not only very weak, but much overcome by our arrival, and it was at first difficult to make out what he said. . .

It was Mr. Welch who, riding in the lead, first saw a strange figure sitting on the bank and said, "Who are you?" To which the reply was, "John King, the last survivor of Burke's party. Thank God, I am saved!"

In 1863 Howitt was appointed Warden of the Goldfields and Police Magistrate for North and East Gippsland, and he lived in this district subsequently for more than 30 years, until 1899. He travelled continuously, furnished geological reports to the Victorian Secretary for Mines, collected botanical specimens for the Govern-

ment Botanist, von Mueller, studied the customs and religions of the aborigines. His books, 'Kumlaroi and Kurrai', and 'The Tribes of South-East Australia', record this anthropological work. He became a member of the Royal Society of Victoria 1876 and contributed many papers to the Proceedings. In connection with his drawings, it is interesting to note that Eugene von Guérard, well-known landscape painter and first Director of the National Gallery of Victoria, was a friend of Howitt's and his companion, at times, on exploratory travels in the East Gippsland area. Other friends and associates were Sir Baldwin Spencer, who recognized the prime value of his anthropological work, and Baron von Mueller, to whom he sent botanical specimens. In 1899 he was appointed Victorian Secretary for Mines, and lived briefly in Melbourne, until 1901. He visited England 1902-3, and after this returned to Metung.

In his later years, Howitt received many honours: honorary Doctorates of Science from both Cambridge and Melbourne Universities; a Fellowship of the Royal Anthropological Society; C.M.G. in the Birthday Honours, 1906; the Clark Medal presented by the Royal Society of New South Wales; the von Mueller Medal presented, inaugurally, by the Australian Association for the Advancement of Science.

We still acknowledge him today. Apart from Mount Howitt in Gippsland, which bears his name, a proposed new water storage planned by the Victorian State Rivers and Water Supply Commission on the Mitchell River is to be named Lake Howitt. During 1969 Melbourne University Press will publish a book on Howitt's life, written by his grand-daughter, Mrs. Mary Howitt-Walker, who lives at Lakes Entrance. Contributions to this publication will be made by two members of the Royal Society of Victoria: Mr. John Mulvaney of Australian National University, and Dr. John Talent who writes also, in this Symposium, on the Geology of East Gippsland.

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G.M.

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Aspects of Exploration and Settlement of East Gippsland

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Abstract

Captain James Cook's observations of 20 April 1770 are summarized, controversy that has arisen from them discussed, and opinions expressed as to the identity of features which he named. A summary is given of George Bass's observations along the East Gippsland coast in December 1797 and January 1798.

It is shown that the Monaro Plains of south-eastern New South Wales provided a natural corridor for land explorers to reach East Gippsland, and later pastoralists with their cattle. Details are given of the discovery of the Omeo Plains by McKillop in 1835 and the depasturing of cattle there by early 1836, of the establishment of an out-station at Tubbut by early 1839, and of an excursion by McMillan to the Buchan area in 1839, followed by the taking up of a run there in early 1840. Some claims to penetration with cattle to the Gippsland Lakes in 1837 or 1839 are refuted. Details are given of the early occupancy of Suggan Buggan, and of the establishment at Wulgulmerang, by the O'Rourke family in about early 1845, of the first permanent homes in the Snowy River district of East Gippsland. The history of early occupancy of the Genoa River district of East Gippsland is outlined, with details of a licence for a cattle run at Wangarabell in 1839, of the use of the Genoa area in 1840, and of an unsuccessful settlement at Mallacoota in 1842.

An appendix lists data, obtained from the New South Wales State Archives, of depasturing licences for runs in and near East Gippsland. This data appears to have been overlooked by others writing about the history of Gippsland. A second appendix summarizes data of runs held in 1848 and 1850, and a third gives extracts of correspondence pertaining to these runs from files held by the Victorian Lands Department.

It is noted that a number of historical articles about East Gippsland contain unsubstantiated statements and factual errors, and it is suggested that statements should be regarded as valid only when acceptable authorities and references are available for them.

1. Introduction

Physiographically, East Gippsland is a continuation of south-eastern New South Wales. (Fig. 1.) The Snowy Mountains, with many ranges between 5,000 and 7,000 ft above sea level, run approximately N.-S. from Australian Capital Territory to the Cobberas Mountains area of East Gippsland. The near-coastal lowlands of East Gippsland and of south-eastern New South Wales rise abruptly, some 30 miles inland, to the Coast Range which, at 3,000 to 4,000 ft elevation, is only slightly higher than the country inland from it.

Between the Snowy Mountains and the Coast Range lie the Monaro Plains, a tract approximately 50 miles wide of undulating subalpine tableland, with a general elevation between 2,500 and 3,500 ft. In the vicinity of Cooma, the 'Dividing Range' is not recognizable to the eye in the wide expanse of tableland, so the plains extend without interruption from the Murrumbidgee River watershed to that of the Snowy River. These plains have their southern limits in the vicinity of Bendoc in East Gippsland, and, though cut off by the Snowy River valley, the Wulgulmerang Plateau too is essentially part of the same system.

The Monaro Plains were lightly forested and well grassed, and they provided a natural corridor by which grazing interests extended from the Goulburn district

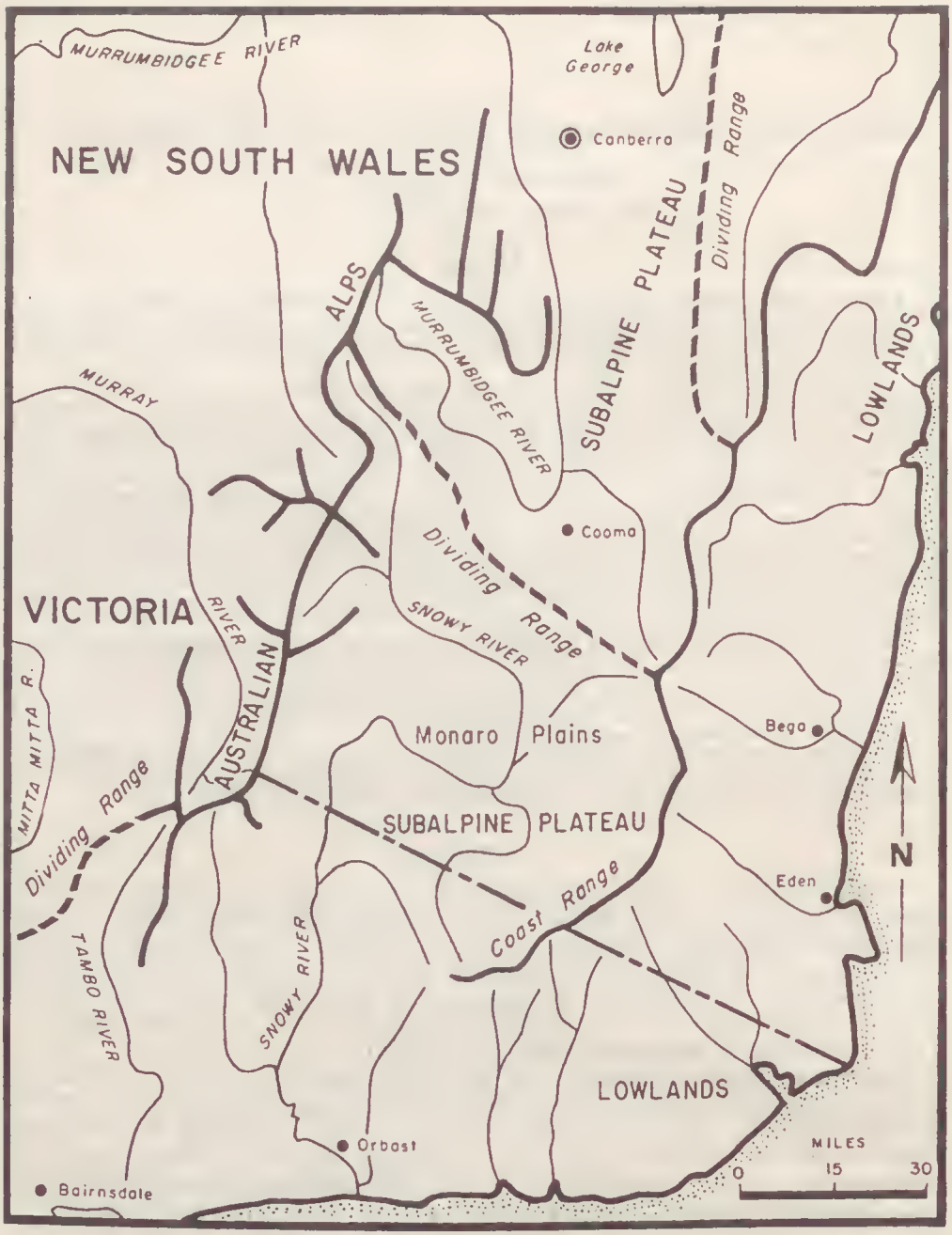

FIG. 1—Topographical relationship of East Gippsland and south-eastern New South Wales.

of N.S.W., via the Cooma district, to Gippsland. W. Odell Raymond, in a report dated 15 August 1853, described how he and others took large numbers of sheep and cattle by this route from Monaro to Gippsland in 1842 (Bride 1898, pp. 129-134).

During the preparation of the present paper it became evident that much that has been published on the history of East Gippsland is erroneous or of doubtful authenticity. This has been due to the acceptance by historians of unconfirmed reports and newspaper articles which do not cite authorities for statements, and to the incorporation of data from these sources in journals which enjoy some prestige. Material of this kind, much of which is now questioned or refuted, was used in a previous paper on the history of Gippsland (Wakefield 1951).

Historical societies were formed recently at Orbost and Bairnsdale, and secondary schools in those areas are now taking considerable interest in the early history of East Gippsland. For these reasons there is discussion in the present paper of certain newspaper articles and other trivial publications, as these sources are used by students and others endeavouring to compile historical information. It is intended that this paper should provide a basis for the evaluation of such data.

In this paper, unconfirmed reports have been discounted, though it is likely that some of these will eventually prove to be valid. The necessity for this principle is evident when it is noted, for example, that the claims of Hutton and Bayliss were for the most part untrue (Section 3(d)), that E. J. O'Rourke was in error regarding his grandfather's history (Section 4(b)), and that John Cameron's history of Maramingo contained gross error (Section 5(c)).

2. Coastal Exploration

(a) James Cook, 1770

Observations recorded by Captain James Cook, in connection with the sighting of the coast and mountains of East Gippsland in April 1770, are summarized, from Wolskel (1941), as follows:

6 a.m. Sighted land extending from NE to W at distance 5 or 6 leagues.
Continued standing to westward until 8 a.m., then bore away NE, being at this time in latitude of 37° 58′ S and in the longitude 210° 39′ W. The southernmost point of land we had in sight which bore from us W¼S I judged to lay in the latitude 38° 0′ S and in the longitude 211° 07′ W from the Meridian of Greenwich. I named it Point Hicks, because Lieut[t] Hicks was the first who discovered this land.
At noon we were in Lat. 37° 50′, Long. 210° 29′ W, 'the extremes of land extending from NW to ENE, a remarkable Point bore N 20° East distant 4 leagues. This point rises to a round hillock very like the *Ram Head* going into Plymouth Sound on which account I called it by the same name. Lat. 37° 39′, Long. 210° 22′.'
Magnetic variation, 8° 7′ E.
At 6 p.m. brought to for the night. Northernmost land in sight bore N by E. ¼E, and a small island close to a point on the main bore W, distance 2 leagues. This point, named Cape Howe, was identified by coast trending N on one side and SW on other, and also by round hills just within it.

Fig. 2 is a copy of part of one of Cook's charts of the south-eastern Australian coastline, published by the British Government in 1789 and reproduced by King (1892). The actual coastline has been superimposed.

The nautical day began at noon, when observations were made to allow the ship's position to be determined. Record was then made of compass readings and estimated speeds, so that the course for the ensuing 24 hours could be plotted. Computations and plotting were done later in the voyage, or after it.

Fowler (1907) pointed out that the date of the observations which are recorded here was actually 20 April 1770.

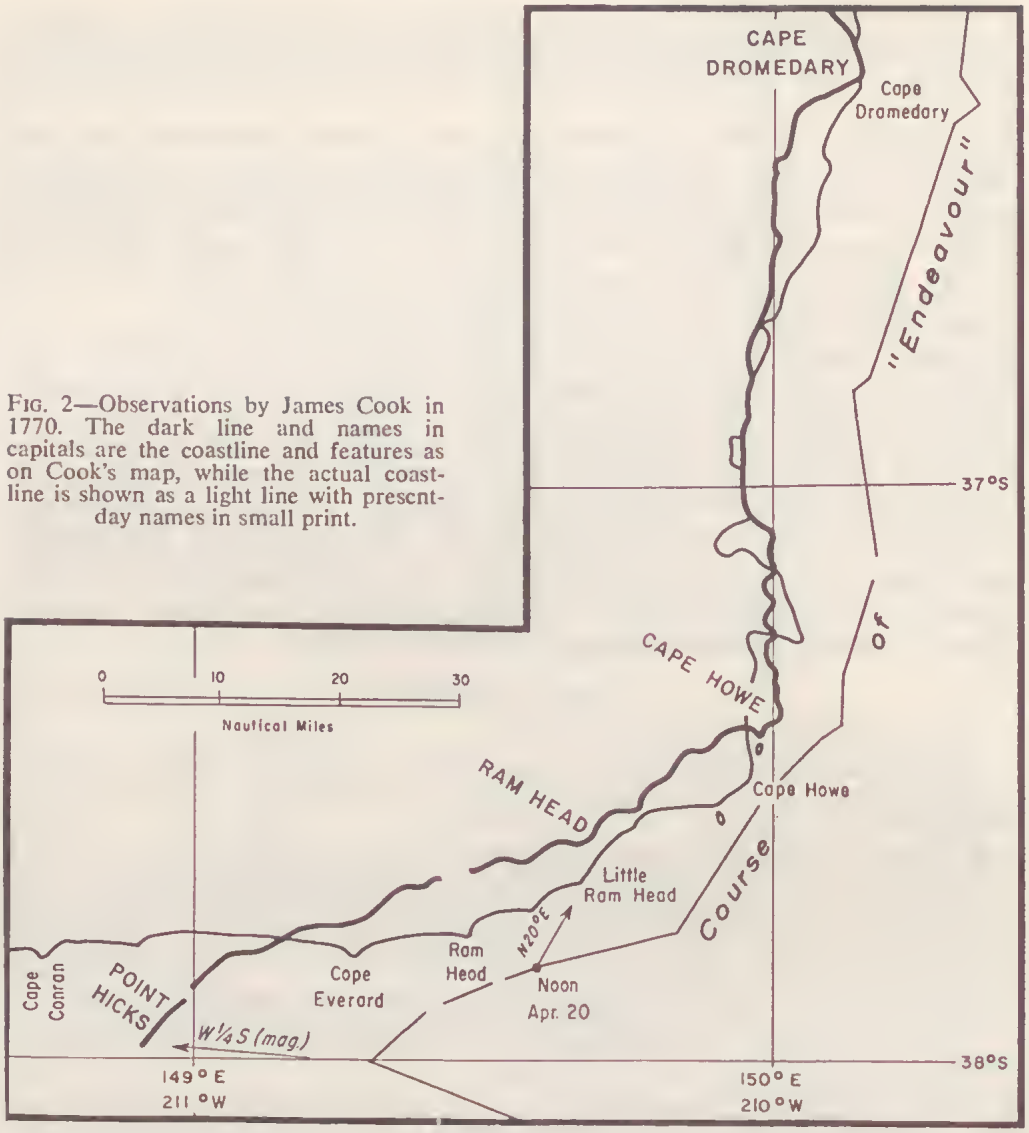

FIG. 2—Observations by James Cook in 1770. The dark line and names in capitals are the coastline and features as on Cook's map, while the actual coastline is shown as a light line with present-day names in small print.

From about Cape Everard to Twofold Bay, Cook's map places the coast north of its actual position by from 3′ to 8′ of latitude. Further north, at Cape Dromedary, the discrepancy is only slight.

The direction recorded for the observation of Point Hicks (W¼S) is a magnetic bearing of approximately 267°, equivalent to a true bearing of 275°, or 5° N. of W. The longitude given (211° 07′) was evidently calculated from an estimation of the distance of the point from the *Endeavour* when the observation was made.

Fowler (loc. cit.) comments: 'The position is in 50 fathoms water, and over 12 nautical miles from the nearest shore', and he concludes, 'The observation was faulty, the compass was in error, or a bank of clouds was mistaken for land.'

From the noon position of 37° 50′S. 210° 29′W. the point which Cook named Ram Head lay 20° E. of N. This appears to be a compass reading of NNE. corrected by the magnetic variation. As noted by Fowler (loc. cit.), 'the description seems to better suit the point now called Little Ram Head, which is only three miles from the position assigned by Cook, the discrepancy being about equal in amount and in the same direction as between Cook's position of Cape Howe and the present accepted position of the same'.

What is now known as Ram Head lies at 37° 46′S. and 149° 29′E., about 12 land miles from the position given by Cook, and it is W. of N. of the noon position of the *Endeavour*.

Scott (1912) argued at length that Cape Everard and Point Hicks were the same. He contended that Cook's expression 'I judged to lay', 'clearly represented a guess, probably made when writing up the journal afterwards', and he was very critical of Fowler's suggestion that Cook could have been in error in his observations. However, the preciseness of the position which Cook gave for Point Hicks does not support the contention that this was a guess. Fowler's three alternatives, to explain Cook's location of Point Hicks, appear to be logical and comprehensive.

In considering the accuracy of Cook's records, it must be remarked that he noted that the 'northernmost land in sight' from the anchorage 2 leagues E. of Gabo Island was 'N. by E. ½E.' (Wolskel loc. cit.), which is a magnetic bearing of 17°, or a true bearing of 25°. That was certainly an erroneous observation. To identify the original 'Ram Head' with the present Little Ram Head, and to place 'Point Hicks' at or near Cape Conran, would indicate only minor discrepancies in Cook's data. But to accept that Ram Head is correctly identified today, or to identify Cape Everard as Point Hicks, would presume gross errors in Cook's records. (See Fig. 2).

(b) George Bass, 1797-8

Except for the final paragraph, which comprises the author's observations, this section is derived from Bass's journal, published in Bladen (1895).

On 21 December 1797, George Bass and the crew of his whaleboat 'landed at a little beach about a mile north of the Ram Head'. A south-westerly gale kept them there for ten days, the boat 'lay off at anchor in a place where, though a swell came in, no breaking-water could'. Bass explored the area and recorded these observations:

> The country here is in general low, sandy, and not without lagoons, yet in figure hilly, but the hills are little else than sand; they have indeed a patched covering of green which might deceive the eye at a distance, but the usual sterility of the soil still prevails. The best I have been able to find is like what at Port Jackson is reckoned so favourable for potatoes, which is a mixture of sand with a very small proportion of vegetable earth.
>
> The general productions are short deformed gum-trees, tea-tree, some small shrubs, and patches of an almost impenetrable underwood of small brush, ground fern, and vines. The foliage of the underwood is rich and green, but the trees are far more dusky and brown than I have seen anywhere else. A luxuriant crop of grass may occasionally be found in places where the underwood has thinned off, but the soil is still the same. Where thick grass belly-high and fern plants are growing together one might expect better soil, but it is only a black sand like the rest.
>
> It is but very few miles that I have been able to penetrate into this close country, but by the sand patches, which when I ascended the Ram Head I could distinctly see peeping out of the sides of the black hills, I can conclude no otherwise than that the soil to a great distance inland is equally poor as, if not worse than, that which I have already trodden over.
>
> There are here many little runs of excellent water that, draining out of the sandhills, trickle over the rocky spots at their feet or sink through the beaches into the sea.

The journey was resumed on 31 December, and for 'about 30 miles' Bass noted:

> The land all the way . . . nearly the same height as about Ram Head—in front, long beaches at the bottom of bights of no great depth, lying between low rocky projecting points—there might be about three of these in the whole distance; in the back land lay some short ridges of lumpy irregular hills at a little distance from the sea.

On 1 January 1798 the craft travelled about 30 to 36 miles along the Ninety Mile Beach, which Bass described thus:

> The land in the whole of this distance was nothing but low beach—a very small hummock appeared indeed every now and then inland. There were many large smokes behind the beach, as we conjectured by the sides of lagoons, of which there was reason to believe the back country was full.

Later, Bass mentioned 'what is called Point Hicks, a point we could not at all distinguish from the rest of the beach'.

What Bass identified as Ram Head is the feature which has that name today. The whaleboat anchorage is a tiny sheltered cove at the westernmost end of the sand bar which separates Wingan Inlet from the ocean; it is protected on the seaward side by a little rocky peninsula. Much of the 'underwood' that Bass encountered was Lilly-pilly (*Eugenia smithii*) which in the vicinity of Ram Head forms extensive wind-pruned thickets only a few feet high. The main vine was Austral Sarsaparilla (*Smilax australis*).

3. Land Exploration

(a) Currie and Ovens, 1823

The Monaro Plains of south-eastern New South Wales were discovered in mid-1823, by Captain Mark Currie, R.N. He set out southerly from Lake George, in company with Brigade-Major Ovens. On 6 June, they turned back, having reached a point a few miles from the present site of Cooma. Currie named the area 'Brisbane Downs' and noted that it was called 'Manaroo' by the natives. (Currie 1825). The party crossed the Umaralla River, which Currie's map identified as the Murrumbidgee.

(b) George McKillop, 1835

Following the discovery by Currie and Ovens, cattle runs were established over much of Monaro during the 1820's and 1830's. The Twofold Bay area was occupied during the same period.

Lhotsky (1834) reported making an excursion from Matong (a station near Dalgety, Monaro) to the Australian Alps, where, on 6 March, he ascended a mountain 'from 5 to 7,000 feet' high and from which, he claimed, he 'discovered towards the SSW a very extensive plain, called by the natives Omeo'. The bearing given suggests that Lhotsky did not actually sight the Omeo Plain. It is more likely that he positioned the plain from the report of the aborigine who told him that 'it contained a lake, bigger than Lake George'.

In 1835, George McKillop and party explored south-westerly from Monaro to the Omeo area. His party 'ascended the sea-side range' at the sources of the Mitta Mitta, and 'saw the sea at a distance of 25 to 35 miles, a low scrubby forest intervening'. These details are summarized from Greig (1912) who cited as his authority 'a paper which (McKillop) sent to the Edinburgh *Journal of Agriculture* in February 1836 (and which was published in Vol. VII; pp. 156-169)'.

McKillop's report stated further that, since his visit, cattle had been sent to

Omeo from Monaro. Bonwick (1883, p. 488) stated that Macfarlane and Livingstone were members of McKillop's party, and that 'Livingstone afterwards formed a station upon the river called after him'. This evidently refers to Livingstone Creek, Omeo, but Angus McMillan's letter (Bonwick, loc. cit.) makes it clear that it was Macfarlane who sent cattle to Omeo from Monaro. (See also Section 3(c) and licence for 11 September 1839 in Appendix 1.) Hansford (1927) added to Bonwick's error by stating that all three—McKillop, Livingstone and Macfarlane—'settled in the Omeo area'.

(c) Angus McMillan, 1839

McMillan and his aboriginal guide, Jemmy Gibber, left Macfarlane's Currawong station on 28 May 1839, and travelled to Tubbut, an outstation of Moore's establishment at Burnima (see Fig. 3 and Appendix 3). They went on, evidently by way of the Deddick River, to cross the Snowy River next day. On 30 May they travelled an estimated 16 miles SSW., through 'fine open country', and on 31 May for a further 15 miles SSW. amongst 'high steep ranges'. On 1 June the distance was eight miles over steep broken country with dense scrub; and on 2 June a more westerly course was taken for seven miles 'over a fearful country'. Next day McMillan ascended a feature which he later referred to as Mount Macleod. On 4 June he travelled six miles NW. to 'a stream running into the Snowy', and thereafter proceeded northerly and reached the Omeo road on 9 June. He followed the road westerly and reached Omeo on 11 June. He found three settlers at Omeo: Macfarlane, Pendergast and Hyland. (These details are from Shillinglaw (1874), who quoted McMillan's diary records at length.)

McMillan's 'fine open country' of 30 May would have been the Wulgulmerang area, and on 31 May the route would have been through what is now Gelantipy. If the compass bearings which he noted in his diary are correct, they would not have taken him to the present Mount McLeod, which lies due S. of the Wulgulmerang area.

(d) Claims by Hutton and Bayliss

McMillan stated, in a letter dated 8 February 1856 and quoted by Bonwick (1883, p. 494) that 'there was a station formed by Mr. R. Wilkinson at Buchan in April 1839' and that 'Buchan was first discovered by Mr. Baylop (sic) in the beginning of the year 1839'.

Skene and Smyth (1874) recorded the following story, given to Alfred W. Howitt, Police Magistrate of Gippsland, by Andrew Hutton, on 17 February 1874:

> Andrew Hutton travelled in 1838 from Nungatta on the Genoa River to the entrance of the lakes with 500 head of cattle and five men. They travelled along the coast, crossing the mouth of the Snowy River. They stayed at the entrance about a week, the natives hunting the party all the time, and finally driving them away and killing the cattle.
> Wilkinson took up Buchan with 100 head of cattle immediately before McMillan came down. About the same time McIntyre took up Gelantipy, also before McMillan arrived.
> When Hutton was hunted away from the entrance, at the time of his first arrival, he found the wreck of the schooner *Shaw*, trading from Sydney to Hobart Town. He buried four or five of the sailors. This was near the Wingan River.

Shillinglaw (loc. cit.) outlined McMillan's and Strzelecki's exploratory work. He quoted the report which Hutton had given Howitt, but with the comment, 'So much for the claims of Andrew Hutton'. A week later, Edward Bayliss replied with a letter (Bayliss 1874) containing the following statements:

I was the first person who opened up that district, in the month of October, 1838.
I started from Aston, Maneroo, . . . made my way to the Ninety Mile Beach, and camped on what is now Ewing's Swamp on the 1st day of November. On the Sunday morning, the 2nd, I walked over the entrance of the lakes, at Jemmy's Point, as it is now named. I . . . returned to Buchan, marked out that as a temporary station, and returned to Maneroo, ...
In February, 1839, I again started for Gippsland, with 715 head of cattle, two drays, and eight men, for building, fencing, etc. I found Wilkinson a day ahead of me, with a few of Mr. F. Mouatt's cattle. I therefore took up Callantipy, and formed that station in March, 1839, and long before M'Millan left Maneroo. My old stockman, E. Bath, was induced to leave me by an offer of higher wages from M'Millan, and that man and my blackfellow, Jemmy Gibbie, showed them the way down several months later. Now for Andrew Hutton's statement. This man . . . was engaged by me in January 1830 (sic) to go down with the cattle and take charge of them when there. However, the engagement was not matured, but I heard that an attempt had been made to take cattle down the coast in 1839 . . . In my muster at Callantipy, in July, I recovered 19 bullocks for them, and sent them into Maneroo.

Greig (loc. cit.), on the authority of 'rev. Geo. Cox (from recollections of Mr. Chas Lucas)', added these details to the Hutton story:

Hutton was employed by Morris, owner of Nungatta Station, and accompanied him in three successive years, on exploratory trips to the south-west. On the first two, progress was blocked by the Snowy River, and on the third they took 500 cattle to the Gippsland Lakes. A man named Wood had gone ahead by boat to Shallow Inlet, with supplies, but returned after waiting there for six weeks.

In connection with the Hutton story, the present author makes these comments:

(i) Wm. M. Morris, resident in the Moruya area, was extending his interests from Moruya to Genoa up until 1840 (see Appendix 1).

(ii) The mouth and estuary of the Snowy River were deep and were navigated by coastal trading vessels until 50 years ago. It is highly improbable that cattle could have been crossed there, and it is even more improbable that a pastoralist would have attempted to take cattle into unexplored country. (Shallow Inlet is 150 miles westerly from the Snowy River.)

(iii) The schooner *Schah* was wrecked, with loss of life, two miles east of Ram Head, on the night of 20 December 1837. After covering two of the dead, A. W. Milligan, the first officer, and the survivors set out overland for Twofold Bay, which they reached on 29 December. (Milligan, 1838). Milligan's report does not mention Hutton's party.

(iv) Taylor (1866) made no mention of the Hutton expeditions (Section 4(c)).

Apart from the improbability of much of Bayliss's story, there are these specific points:

(i) In 1838, 2 November was a Friday.

(ii) Ewing's Morass is east of Lake Tyers and, at its nearest point, is at least four miles from the original entrance of the Gippsland Lakes and over nine miles from Jemmy's Point.

(iii) Wilkinson held Buchan in his own right until 1842, when Mowatt acquired it. (see Appendix 1.)

(iv) Gibber was McMillan's sole companion on the excursion to the Buchan area in 1839 (see Section 3(c)), and Edward Bath accompanied him into central Gippsland in 1840 (Bonwick loc. cit.).

(v) Bayliss's timing would place Hutton's supposed Gippsland Lakes expedition more than a year later than the wreck of the *Schah*.

McMillan made no mention, in the reports of his 1839 excursion through the Gelantipy and Buchan areas, of any sign of cattle there. If his information to Bonwick (loc. cit.) was based on claims made by Bayliss, then it is highly suspect.

If the location of the run obtained by Bayliss in September 1839 were determined (see Appendix 1), it might throw light on this matter.

On data available during this study, it would appear that, while Bayliss may have discovered Buchan sometime in 1839, the later claims of both Bayliss and Hutton to penetration with cattle to the Gippsland Lakes area in 1839 or before are untrue.

4. Settlement in Snowy River District

(a) Early Runs

None of the three settlers whom McMillan reported to be at Omeo in June 1839 (Section 3(c)) did, in fact, have his home there. Macfarlane resided at Inverlochy, near Goulburn, and his 1839 licence was for 'Currawong and Omeo' (Appendix 1). In 1854 the buildings on his Omeo run were still only huts (Appendix 3). Evidently, Pendergast and Hyland both regarded their use of the Omeo area as auxiliary to main interests in N.S.W., for neither mentioned Omeo in connection with their early licences (Appendix 1).

Tubbut was an auxiliary of Moore's run at Burnima, N.S.W., from about late 1838 to 1852, when Whitakers acquired it to establish a family home there (Appendix 3). Campbell's 1839 licence included Delegate, and this run probably extended into East Gippsland at that time (Appendixes 1 and 2). Wilkinson's licence for Buchan in January 1840, and Hensleigh's for Bendock in June 1842 (Appendix 1), were the first to be obtained for runs in the Snowy River district of East Gippsland. Gelantipy was evidently used by Hughes and McIntyre of Gunningrach, N.S.W., from about 1843 onward (Appendix 3).

Buchan (*A. W. Howitt, 1876.*)

(b) Suggan Buggan and Wulgulmerang

Due apparently to misinterpretation of statements in letters in Lands Department files (Appendix 3) and to incorrect data on a gravestone, an erroneous history has come to be accepted concerning early settlement in the Suggan Buggan and Wulgulmerang areas.

For example, a newspaper article stated that Edward O'Rourke settled at Suggan Buggan in 1838, and his brothers, James and Christopher, settled at Black Mountain and Wulgulmerang ('N.B.' 1948). Edward was, in fact, a son of James, and in 1838 he was about nine years old (this section, below). James O'Rourke's statement in 1848, that he had been a licensed payee in the District of Monaro for ten years (Appendix 3), referred mainly to his licence for Countegany, near Cooma (Appendix 1).

In another newspaper article, E. J. O'Rourke, son of Edward, stated that James O'Rourke moved to Black Mountain in 1840, where he resided for some time before shifting to Wulgulmerang. He stated further that Black Mountain had been occupied previously by Richard Brooks and that 'Hugden' occupied Suggan Buggan before Woodhouse. (O'Rourke, 1936). The first statement is contradicted by James O'Rourke's information to J. J. Hedley (Appendix 3); no depasturing licence was found in the name of Hugden; and the only indication that was found of an interest by Richard Brooks in this district was his tenancy of the Willis run in 1848 (Appendix 2).

Edward O'Rourke's statement, dated 13 April 1868, that his improvements had been at Suggan Buggan for 20 years (Appendix 3), would have referred to the 'Forest Paddock' on the Wulgulmerang Plateau, which, though not in the Suggan Buggan valley, was included in O'Rourke's Suggan Buggan run (see this section, below).

The first licence for Suggan Buggan, that for the year 1842-43, was issued to William Woodhouse in April 1843 (Appendix 1), and Victorian Lands Department records (Appendix 3) show that it passed through the hands of Kesterton and McGuffie before Edward O'Rourke first obtained it in January 1858. Additional details have been provided by the General Drafting Branch, Department of Lands, Sydney (letter, 1 August 1961), as follows:

> Licence . . . held by William Woodhouse between 1842 and 1845; in 1845 . . . by Benjamin Boyd. In 1849 the lease was transferred to William Sprott Boyd. It was subsequently acquired by Samuel Browning and transferred by him to Alexander Campbell in 1851. In 1852 it was transferred to John Henry Challis.

Information regarding early settlement in the Wulgulmerang area was obtained from F. Smyth and K. Daniel (pers. comm. 1967), grand-daughters of David O'Rourke, Jnr., a son of Christopher O'Rourke, Snr. This is the authority for statements in the remainder of this section relating to O'Rourke family history.

James O'Rourke's home was at Wulgulmerang from about early 1845 until 1852 (Appendix 3), after which he removed to the Yarram area of South Gippsland.

Christopher O'Rourke, Snr., younger brother of James, made his home at Black Mountain, on the north side of the Little River, also about early 1845, when his second son, David, was two years old. He died in 1854, aged 44. (The stone on his grave at Black Mountain was made in Bairnsdale with year and age incorrectly inscribed as 1844 and 54 respectively.) At the time of Christopher's death, his sons, John and David, were aged about 14 and 12 years respectively.

Edward, eldest son of James O'Rourke, returned to the district and managed

the Little River run for a number of years before acquiring the Suggan Buggan run in January 1858.

Christopher, Jnr., second son of James O'Rourke, acquired Wulgulmerang in February 1859 (Appendix 3) and made his home there. (Letters in the Wulgulmerang file, Lands Department, Melbourne, incorrectly refer to John and Christopher, Jnr., as brothers.)

In August 1859, John O'Rourke was granted Little River as a new run (Appendix 3). It had been occupied without licence for the 14 years prior to that date. He resided there until 1868, when he removed to the Wulgulmerang run, from which he retired to Bairnsdale in 1909. (Little River run later became known as Black Mountain.)

Edward O'Rourke removed from Suggan Buggan to Benambra in about 1884 but continued to run cattle on Suggan Buggan. He died at the 'Forest Paddock' of the Suggan Buggan run, in 1902, aged 73, and was buried at Black Mountain.

There was also a David O'Rourke, Snr., brother of James, who lived in the Wulgulmerang area for some time. He died at Appin, N.S.W., in 1855.

David O'Rourke, Jnr., had a house on part of the Wulgulmerang run until 1867, when he removed it to the south side of the Little River at Black Mountain, where he resided until 1879, when he removed to Buchan.

The brothers James and Christopher O'Rourke, coming to the Wulgulmerang area in about early 1845, were the first settlers to establish permanent family homes in the Snowy River area of East Gippsland.

(c) Orbost Area

Cameron (1926) stated that Peter Imlay occupied Orbost with 800 head of cattle from Monaro but abandoned the locality after trouble with the blacks, and that N. and J. Macleod succeeded him there.

An anonymous historical article, in a booklet printed in Orbost in 1937, stated:

> As far as can be gathered the first settlement in the Orbost District took place in 1842 when Mr. Peter Imlay brought cattle from New South Wales and settled on the eastern side of the Snowy River where the Orbost township now stands. Peter left Monaro with 800 head of cattle and travelled down Cann Valley and crossed the Lower Bemm.

Neither Cameron nor this anonymous writer substantiated their statements in any way.

The depasturing licences in the name of Peter Imlay in the early 1840's were for Bega and Walumla (Appendix 1), and no evidence was found that he had interests at any time in the Snowy River area.

Norman Taylor, after spending several months in close association with the pioneers of the Genoa district, stated that 'no one has ever been across from the Cann to the Snowy River, except along the coast, and the party that did that lost all their horses, and were all but starved'. (Taylor loc. cit.) He made no mention of cattle being taken to the lower Snowy River or beyond.

Norman and John Macleod, who held the first licences for runs in the Orbost area (Newmerella and Orbost, respectively) each stated that the date from which he had held the licence was 1 July 1847 (Appendix 3). This does not necessarily mean that they occupied these runs on that date. Depasturing licences were issued for the whole of the financial year and dated as from 1 July, irrespective of the actual date of occupation of a run.

The anonymous historical article mentioned above (printed Orbost, 1937) stated further:

From official files it is found that in 1845 Grazing Area No. 34 Orbost was held by Arch Macleod and carried 800 cattle. At the same time Grazing Area No. 33, 16,000 acres at Newmerella or Lochend, was held by the same people and carried 500 cattle and 2,000 sheep.

The numbers 33 and 34 are those allotted to these runs in the N.S.W. *Government Gazette* of 13 September 1848. The date '1845' is evidently a mistake for 1848, and the 'Arch Macleod' is an error also (See data in Appendixes 2 and 3). Furthermore, the numbers of cattle and sheep given here were merely those noted in the *Gazette* under the heading 'estimated capacity', not actual stock on the respective runs.

5. Settlement in Genoa River District

(a) Wangrabelle

The first depasturing licence for an East Gippsland run was that for Wangrabelle, issued to John Stevenson in November 1839 (Appendix 1). Stevenson retained this run for at least 11 years (Appendix 3).

Details of stations and residents in the Genoa River district are given in a book by an ex-convict, Joseph Lingard, who travelled through the area in about August 1842. At that time, a family named Donald was in residence at Wangrabelle. (Lingard, date unknown.)

(b) Genoa

Wm. F. Morris held Nungatta and Genoa for the year 1840-41 (Appendix 1), and Greig (loc. cit.) stated that Morris sold to 'Abercrombie'. However, no depasturing licence was found either in the name of Morris or Abercrombie for the period 1842 to 1846.

A map prepared by F. P. MacCabe in February 1847 (now held by Lands Department, Melbourne) shows two paddocks on the south side of the river about where Genoa is now located, labelled 'Campbell's Cattle Station'. A depasturing licence was issued to Campbell and Co. on 25 September 1846, which, though specifying Gundary only, presumably covered Nungatta and Genoa as well (See Appendix 1, licence for 14 August 1840).

(c) Maramingo

Cameron (loc. cit.) set out details about Maramingo: Taken up by Robert Greig about 1841, sold to T. Doyle, sold to A. Weatherhead in 1847, sold to J. Allan in 1850-51 when Weatherhead bought Nungatta.

The present investigation has not ascertained whether Maramingo was in fact the identity of 'Mirimalka' (or 'Mirunalka'), a licence for which was issued to Robert Greig in January 1841 (Appendix 1). No record was found of a depasturing licence held by Greig between 1841 and 1846, and neither Maramingo nor 'Mirimalka' was amongst the runs listed in the N.S.W. *Government Gazette* of 1848 or 1850.

Lingard (loc. cit.) found 'a station on each side of the river' at Genoa in about August 1842, and MacCabe's Genoa River map of February 1847 has 'Js. Allan's House' and 'Shannon's Cattle Station hereabouts' marked in the Maramingo area, directly across the river from the Genoa paddocks. Taylor (loc. cit.) referred to Allan's home at the same place. Campbell's reference to Genoa having 'no neighbours' (Appendix 3) appears to have been erroneous.

Cameron was in error in some details. Maramingo was applied for by

Weatherhead in April 1853 (Appendix 3), and Weatherhead (1891) indicated that he bought and occupied Nungatta in 1859. (However, Weatherhead lived at Nungatta as overseer during an earlier period; he was there when Lingard visited the area in 1842.)

(d) MALLACOOTA

Greig (loc. cit.) made two statements about the settlement of Mallacoota. The first quoted letters in the Melbourne newspaper, *The Argus* (25 May and 28 May 1909) which said that Mallacoota 'was settled previous to the Messrs. Henty Brothers' arrival at Portland towards the close of 1834', and that 'the settler's name was Stevenson—an ex-ship master—and his homestead was at what is still known locally as Captain's Point'. The second stated that 'the year 1842 saw the location, at Mallacoota Inlet . . . of an ex-whaler named John Stevenson, who had been in the employ of Benjamin Boyd, of Twofold Bay'. For this second statement, Greig gave as authority 'Mr. J. M. Reid, to whom it was communicated by Mr. Wm. Allan, grandson of Captain Stevenson'.

Cameron (loc. cit.) stated that Stevenson arrived at Twofold Bay in 1836 in the Brig *Horn*, a Greenland whaler, with Robert Greig as First Mate.

Benjamin Boyd arrived in Australia on 18 July 1842 and resided in Sydney. He made only infrequent visits to Twofold Bay, and the whaling operations carried on there in his name were from 1843 to 1848. (Wellings, date unknown.)

Lingard (loc. cit.) indicates that, in about July 1842, he met Stevenson, who 'had formed a station near Cape Howe', and 'he and his family had been there about three months'. The station was later identified as Mallacoota. Lingard travelled from Bondi to Mallacoota where he stayed until the late spring of 1842. Living in 'two huts made with bark and covered with bark, . . . close to the beach', were the Stevenson family and a second family. This settlement was later abandoned, for MacCabe's map bears the inscription 'An abandoned Cattle Station' at the site of Mallacoota.

Stevenson's huts would have been those mentioned by S. C. Johnson as having been occupied by William Baird (Appendix 3). Billis and Kenyon (1932) stated that Baird was at Mallacoota from 1850 to 1854.

Summary

James Cook's recorded observations of the East Gippsland coast on 20 April 1770 do not justify the identification of his 'Point Hicks' with Cape Everard, and his 'Ram Head' appears to be the feature now called Little Ram Head. George Bass's journal of December 1797 records observations of vegetation and soil about Wingan Inlet, and, while he identified the present Ram Head as Cook's Ram Head, Bass failed to distinguish any feature as Point Hicks.

In 1823, Currie and Ovens discovered the Monaro district, and by 1840 cattle were depastured across these plains and into parts of East Gippsland. James Macfarlane sent cattle to Omeo soon after its discovery by George McKillop in July 1835. Tubbut was in use as an out-station of Thomas Moore's Burnima run in early 1839, when Angus McMillan penetrated the Buchan area; John Wilkinson obtained a licence for the Buchan run in January 1840; John Hensleigh obtained a licence for the Bendock run in June 1842; and Hughes and McIntyre used Gelantipy from about 1843 onward, as an out-station of their run at Gunningrach, N.S.W.

The first grazing licence for the Suggan Buggan run was taken out in April 1843 by William Woodhouse, and this run changed hands several times before

Edward O'Rourke obtained it in January 1858 and established a home there. The brothers James and Christopher O'Rourke were the first permanent settlers in the Snowy River area of East Gippsland; they established family homes at Wulgulmerang and Black Mountain in about early 1845. Christopher died in 1854, not 1844 as his gravestone indicates. The first grazing licences for the Newmerella and Orbost runs were those obtained by Norman and John Macleod sometime between July 1847 and May 1848.

In the Genoa River valley, John Stevenson obtained a licence for the Wangarabell run in November 1839, and Genoa was used as an out-station of William Morris's Nungatta run in 1840. John Stevenson settled with his family at Mallacoota early in 1842 but had abandoned the site by February 1847. Maramingo was occupied prior to August 1842 but its early history is obscure.

Neither the claims that Andrew Hutton took cattle from Nungatta to the Gippsland Lakes in the late 1830's, nor the statement that Peter Imlay took cattle via the Cann River valley to Orbost in the early 1840's, is accepted as valid; and the claim that Edward Bayliss reached Buchan before Angus McMillan did is considered to be dubious.

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APPENDIX 1

Depasturing Licences, 1837 to 1846

Copies of depasturing licences issued from 1837 to 1846 are preserved in the New South Wales State Archives. They are bound, in chronological order, in 18 volumes. The first volume contains those for the year 1837-38. There is no record of any licences for 1838-39, and the set for 1840-41 may be incomplete. The last licences in the bound volumes are for the year 1845-46. Each volume containing licences issued between 1837 and 1844 contains an index of the licensees, but the several volumes of licences for 1845-46 are not indexed. Each licence was issued for a single financial year (ending 30 June) and the annual fee for each was £10.

Further information is contained in a letter received from the General Drafting Branch, Department of Lands, New South Wales, in August 1961, as follows:

> Although there was settlement in the Monaro district in the 1820's and 1830's, no official record exists until the Depasturing Licences of 1837 were issued. These licences gave no description of the location of runs and very often no run name. Licensees were required to indicate the situation of their holding within a particular district and it is under this heading that the run name, if any, is given.

Search was made through the indexes of the earlier volumes of the depasturing licences and data extracted about certain licensees, and all Monaro district licences for the year 1845-46 were perused. This method of search may have overlooked some relevant data of licences which changed hands between 1837 and 1845.

In many cases the place of residence of the licensee indicated that he did not live on the run for which the licence was issued. Furthermore, licences were sometimes held for short periods (possibly under some form of mortgage) by certain companies, and in these cases there is no indication of who actually occupied or used the runs concerned.

Billis and Kenyon (loc. cit.) published data of pastoral leases and lessees in the Port Phillip District (= Victoria). Their compilation was based almost wholly on records in the Victorian Department of Lands, Melbourne, and it lacks much relevant information that is available in the New South Wales State Archives.

Following are dates of issue and other data of licences which concern, directly or indirectly, the early history of East Gippsland:

21 February 1837. 'Snowey River'. Edward W. Bayliss of 'Snowey River'. (See also 24 September 1839.)
7 March 1837. Bergalia. Wm. F. Morris of Moruya. (This is Morris's only licence for this year. See also 1 November 1839 and 16 September 1839.)
11 March 1837. Monaro, location unspecified. Robert Campbell. (Same data 29 May 1838. Both licences probably apply to Mount Cooper only. See also 12 July 1839.)
3 August 1837. Monaro, location unspecified. Francis Mowatt of Narellan. (This may apply to Bollero. See 12 July 1842.)
15 February 1838. Appin. James O'Rourke. (This is his only licence for this year. See also 1 October 1839.)
8 June 1838. Monaro, location unspecified. John Pendergast of 'Monaro'. (See also 9 November 1839.)
19 June 1838. Monaro, location unspecified. Alexander Livingstone of 'Monaro'.

30 June 1838. Monaro, location unspecified. James Macfarlane of 'Inverlochy', Goulburn. (See also 10 September 1839.)
11 July 1839. Burnima. Thomas M. Morre. (His first licence.)
12 July 1839. Mount Cooper and Delegate. Robert Campbell. (See also 30 June 1840.)
20 July 1839. 'Boro Creek, Mowenbar' (= Moonbah). Thomas Hyland. (Same data for subsequent years.)
10 September 1839. 'Currawong and Omeo'. James Macfarlane of Inverlochy. (Same data, 1840-1843.)
13 September 1839. 'Biggah' (= Bega). Peter Imlay of 'Biggah'.
24 September 1839. 'Aston, near Mount Delegate'. Edward Lord of Sydney (Mortgager?).
24 September 1839. 'Beyangus' (?spelling). Edward W. Bayliss of Aston.
1 October 1839. Countegany. James O'Rourke of Countegany. (Same data for subsequent years. See also 23 September 1845.)
1 November 1839. Bergalia. John Hawdon of St. Vincent.
9 November 1839. Cottage Creek. John Pendergast of Cottage Creek. (Same data annually until 1842-43, except that residence was at Campbelltown in 1840-41.)
16 November 1839. Gundary and Nungatta. Wm. F. Morris of Gundary. (See also 14 August 1840.)
16 November 1839. Wangarabell. John Stevenson, of Twofold Bay. (Same data for 1841-42, except that no residence was stated. No licence recorded for Stevenson thereafter.)
30 January 1840. Buchan. John R. Wilkinson, giving residence as Buchan. (Same data up to year 1841-42 but with 'Murrindale' included in the last.)
29 June 1840. 'Gunigrali' (= Gunningrach). John Terry Hughes and John McIntyre of 'Gunigrali'.
30 June 1840. Delegate. Robert Campbell. (Mount Cooper not included. Same data for subsequent years.)
14 August 1840. Gundary, Nungatta, Genoa. Wm. F. Morris of 'Gundary on the Moruya'. (No subsequent licence in name of Morris.)
29 September 1840. 'Walamba' (= Walumla). Peter Imlay. (Same data for subsequent years.)
1 January 1841. 'Mirimalka' (?Maramingo). Robert Greig of 'Biggah' (= Bega). (No further licence in name of Greig or for 'Mirimalka'.)
29 February 1841. Bondi. Thomas Luscombe. (Same data for subsequent years.)
28 September 1841. Delegate. George Simpson. (Same data for subsequent years.)
27 June 1842. Bendock. John S. Hensleigh. (Same data for subsequent years.)
12 July 1842. Bollero and Buchan. Francis Mowatt of England. (Same data for two following years. See also 25 September 1845.)
29 September 1842. Craigie. Charles Lawson. (Same data for subsequent years.)
3 April 1843. Suggan Buggan. William Woodhouse of 'Snowy River'.
28 September 1844. Countegany. John Hawdon. (But see 23 September and 30 September 1845.)
23 September 1845. Countegany. James O'Rourke. (But see 30 September 1845.)
25 September 1845. Gundary. Campbell and Co.
25 September 1845. Buchan. Francis Mowatt.
25 September 1845. Willis. Francis Mowatt.
26 September 1845. Ingebyra. William Woodhouse. (His only licence for this year.)
30 September 1845. Countegany. John Hawdon. (But see also 23 September 1845.)
6 November 1845. Suggan Buggan. Benjamin Boyd.
20 November 1845. Jingalalla. Peter Taylor.

Appendix 2

Summary of Runs, 1848 and 1850

In the N.S.W. *Government Gazette* of 13 September 1848 there was a summary of pastoral leases, giving name of lessee, name of run, and description of boundaries. A supplementary list appeared in the N.S.W. *Government Gazette* of 6 April 1850. The boundaries were not surveyed, and the descriptions of them, in the *Gazettes* were simply quotes of details submitted by lessees with their applications for grazing rights. Fig. 3 shows the location of runs in East Gippsland at about that time, and some runs in adjoining regions.

FIG. 3—Location of runs in East Gippsland and some runs in adjoining regions, as in 1850. In each case the headquarters of the run was about where the centre of the name falls.

This appendix sets out data of runs, extracted from the *Gazettes*. The names of the runs (with modernized spelling)* are placed in alphabetical order, followed by the lessee in each case, then, in parenthesis, there is information about location or boundaries. The items in brackets are observations by the present author. Unless otherwise stated, the run was listed in the N.S.W. *Government Gazette* of September 1848.

BENDOCK. J. S. Hensleigh. (Between Campbell's Delegate run, Delegate Hill, Bendock River, and a NS. range to the east.)

BONDI. Benjamin Boyd. (Bounded on S. by 'Black Mountain or Coorambocombala'.) [This is the present Coopracambra Mountain in East Gippsland.]

BUCHAN. Archibald Macleod. (Snowy River on E., Boggy Creek on S., Wilkinson River on W., 'Black Mountains' on N.)

CRAIGIE. Charles Lawson. (A small portion extended into East Gippsland along the lower Bendock River.)

DELEGATE. Estate of late Robert Campbell. (One section, between Hayden's Bog and Mount Delegate, lay within East Gippsland.) ['Mr. Boyd's cattle station hut known as Kirkenong', is mentioned.]

DELEGATE. George Simpson. (Between Delegate Hill, Campbell's Delegate run, and Hensleigh's Bendock run.)

GELANTIPY. Hughes and McIntyre. (*Gazette* 1850.) (Watered by a creek known as Butchers Creek; Snowy River on E., range on S. dividing it from Mr. Scott's Buchan run, gully four miles from 'Wongollamerang' run on N.) [The 'gully' is Boundary Creek.]

GENOA. Wm. Campbell and Co. (*Gazette* 1850.) ('on a river of that name in a wild country, no neighbours'.)

JINGALALLA. Charles Lawson. (Between Moore's 'Tubbut' run and McLaughlin's run, with a swamp on S.) ['McLaughlin's run', is evidently Dellicknora, and Jingalalla is now named Cabanandra. (see Fig. 3).]

* It will be noted that in the early settlement of East Gippsland (as even today) the spelling of place names was not standard. (*Ed.*)

[KIRKENONG, LITTLE RIVER, MALLACOOTA . . . not in either *Gazette*.]
NEWMERELLA or LOCHEND. Norman R. Macleod. (Snowy River on E., barren heathy ridges parallel with the Ninety Mile Beach on S., dense scrub running parallel to the Snowy River on W., black range known as the Haystack Mountain on N.) [The 'Haystack Mountain' is probably Mount Tara, 15 miles WNW. of Orbost, not Mount Macleod near Buchan which is sometimes referred to as the Haystack.]
ORBOST. John Macleod. (Brodribb River on E., Snowy River on S. and W., ranges about 15 miles below the Buchan River Junction on N.)
QUEENSBOROUGH. Benjamin Boyd. ('Nicholson's Bog' on E., Little River on W., Bendock River on N.) ['Nicholson's Bog' is evidently Craigie Bog.]
SUGGAN BUGGAN. Benjamin Boyd. (Ranges towards the 'Snow Mountains' on E., Black Mountain on S., 'Omeo Ranges' on W. and N.) ['Snow Mountain' is probably a mistake for Snowy River.]
[TUBBUTT, WANGARABELL . . . not in either *Gazette*.]

Persons more or less concerned in the history of East Gipsland were listed in the *Gazette* 1848 as having these runs:

Peter Imlay. Cobargo, Murrah and Double Creek (all in the Bega-Narooma area).
Francis Mowatt. Bolero (near Cooma).
John Pendergast. Cottage Creek (near Cooma), Moonbah (south of Jindabyne), and 'Homeo' (= Omeo).
William Whittakers. Tombong.

APPENDIX 3

Files in the Department of Lands, Melbourne

Further to data noted in Appendixes 1 and 2, the following details were extracted from files of correspondence held by the Victorian Department of Lands.

In 1847, run holders were requested to make formal application for leases, and on these there was usually a standard statement that the run had been occupied 'for 12 months previously', but this does not necessarily indicate the date of original occupancy.

BUCHAN. 31 December 1847. Applied for by Archibald Macleod of Bairnsdale.
GELANTIPY. 11 August 1848. John McIntyre stated that the station had been in the possession of Messrs. Hughes and McIntyre for 5 years and was included in the licence for Gunningrach, N.S.W. The description mentioned the 'Galantiby Hut', showing that the run was merely an outstation in 1848.
GENOA. 18 July 1853. Peter Imlay, as holder of the Genoa run, applied for its transfer to Robert Alexander.
LITTLE RIVER. 19 March 1859. Run applied for by John O'Rourke, described as 'bounded on E. by Sugan Bogan Black Range and the station of Edward Rourke . . . W. by Christopher Rourke's station named Wan Woologorang . . . S. by Snowy River . . . N. by falls from mountains'. (Note: In this description, the points of the compass have been rotated 90°, so the 'W' here is actually S., etc.)
MALLACOOTA. 23 May 1856. Application by S. C. Johnson for Mallacoota run, in which he described it as having 'a couple of huts and a stockyard'. He stated that it had been occupied by William Baird, an Otaheiteian, who had died in 1854.
MARAMINGO. 8 April 1853. Run applied for by Alexander Weatherhead of Eden. Boundaries were Genoa River on S. and W. and 'Tombillica River' (= Wallagaraugh River) on E.
NEWMERELLA or LOCHEND. 16 May 1848. Norman Macleod stated 'the precise period during which I have held licence for . . . Numeralla or Lochend . . . (is) from 1st July 1847'.
OMEO. 23 March 1848. In application for lease (Omeo A), John Pendergast gave his address as Campbelltown.
9 October 1854. W. Piper, Commissioner of Crown Lands, described the improvements (Omeo B, James Macfarlane's run) as 'the homestead of an original and entire run since the year 1849 consisting of two huts, stockyards, stables, garden, grazing and cultivation paddocks'.

ORBOST. 29 May 1848. John Macleod stated 'the precise period during which I have held a licence for my station called Orbost . . . is from the 1st of July 1847'.

SUGGAN BUGGAN. 31 December 1847. Application for run by Benjamin Boyd.

20 October 1856. Transfer from Henry Kesterton to James McGuffie.

22 January 1858. Transfer from McGuffie to Edward O'Rourke.

13 April 1868. Edward O'Rourke stated that his improvements had been at Suggan Buggan for 20 years.

TUBBUT. 7 October 1847. Thomas M. Moore of Burnima, N.S.W., stated that he had occupied the Tubbut run for the previous nine years. (This has led to the published statement (Hansford, loc. cit) that Moore took up the run in October 1838, but Moore's round figure of 'nine years' does not justify Hansford's precise dating of the month of original occupancy.)

18 October 1851. Moore stated that Burnima had been the head station, and that Tubbut and Amboyne were auxiliaries, the last a 'sheep station'.

30 October 1852. William Whittakers acquired the Tubbut run.

WANGARABELL. 24 October 1850. J. J. Tyers, Commissioner of Crown Lands, stated that John Stevenson had occupied the run, without taking out any licence, for the previous seven years. (See licence, 16 November 1839, in Appendix 1.)

WULGULMERANG. 25 June 1848. James O'Rourke applied for 'Woologoramang'.

12 August 1848. James O'Rourke stated that he had been a 'licensed payee in the District of Manero for a period of ten years'. (See licences for 15 February 1838 and for subsequent years, in Appendix 1.) The run was described as bounded by Snowy River to E., Mrs. Terry Hughes to W., Deep Creek mountains to N., scrub and barren ranges to S. (In this description also, the points of the compass are rotated 90°, as with the description of Little River, above.)

16 February 1852. Transfer from James O'Rourke to P. C. Buckley.

26 February 1859. Transfer to Christopher O'Rourke.

25 March 1860. J. J. Hedley, Commissioner of Crown Lands, stated, 'from the original occupant (i.e. James O'Rourke) I learn that the north boundary was a deep creek (south of the Little River) rising in the Native Dog Ranges and falling into the Little River before its junction with the Snowy River'. (The 'deep creek' is Wulgulmerang Creek.)

7 May 1860. J. J. Hedley stated, 'James Rourke, first licensee of Wulgulmerang, states that he never applied for nor occupied the country beyond the deep creek south of the Little River. He held the run seven years and then sold to Mr. P. C. Buckley. Buckley sold to Captain Jones who . . . never occupied the run but sold to Christopher Rourke the present occupant'.

2

The Climate of East Gippsland

By D. J. Linforth

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Abstract

In this analysis of the climate of East Gippsland, the elements of rainfall, hail, snow, temperature and fog are discussed and related to the synoptic features which affect the area.

The most significant feature is the 'east coast depression', which can bring heavy rain to the area and cause flooding. The region has one of the more dependable rainfalls in Victoria, although drought is by no means unknown.

The air temperature can vary from below freezing point in a winter frost, to over 100°F in a summer heat wave. Mean temperatures are not very different from those elsewhere in southern Victoria, but with northerly winds in winter, parts of the region may experience the highest day-time temperatures in the State.

The incidence of fog in the lower river valleys is usually confined to winter mornings, but sea-fog occurs in summer and may affect the coast.

Introduction

The climate of East Gippsland is different in many respects from that of the remainder of Victoria. It is subject to the influence of vigorous depressions off the N.S.W. coast, and incursions of warm, moist subtropical air from the Tasman Sea, and has a climate more akin to that of coastal N.S.W. Rainfall in the area can be very heavy, resulting in rapid flooding of coastal streams. Sea fog is not uncommon in summer, and may affect the coastline, while day-time temperatures in winter may be the highest in Victoria.

Observing Stations

The area has not been well served with climatological stations in the past, although the number has been increased in recent years. At the oldest station, Gabo Island, 100 years of records are available, but since this station is situated on an island off the coast, the records are only typical of the area close to the coast. The station at Orbost has been in existence for over 25 years and those at Cann River and Nowa Nowa for over 15 years, although the records at these latter two are somewhat incomplete.

Stations have been opened in the past five years at Lakes Entrance, Cape Everard and Bendoc, but the period of record is too short for mean values to be calculated. Bendoc, at an elevation of 2,750 ft, is the only station located in the highlands of the area.

There are over fifty rainfall stations, of which twelve have more than fifty years of record. The rainfall stations are situated in the settled parts along roads and river valleys, and thus little is known of the rainfall in the more mountainous country.

Synoptic Features

The predominating circulation pattern which affects Victoria is an irregular succession of depressions and anticyclones. Although these systems generally move

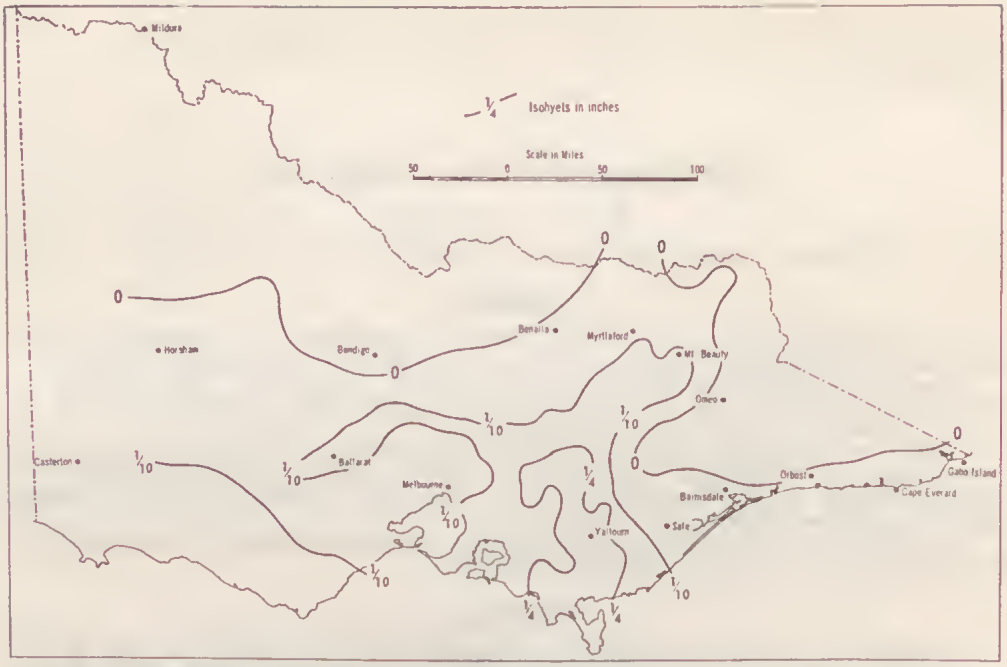

FIG. 1—Rainfall distribution after passage of cold front. Rainfall for 24 hours ended 9 a.m. 11 May 1966.

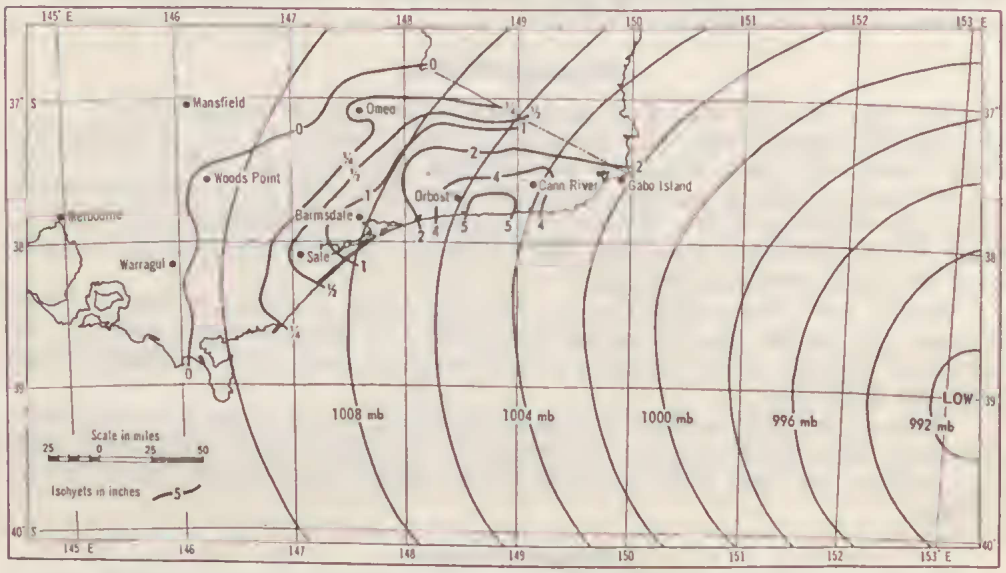

FIG. 2—Surface Isobaric pattern 6 a.m. 21 February 1966 and Rainfall for 48 hours ended 9 a.m. 21 February 1966.

from W. to E., this is not always the case. Systems can develop or degenerate in the area. Their speed of movement can vary considerably, and they can remain quasi-stationary for even a week or more at a time.

A common rain-producing situation for most of southern Victoria is the passage of a depression to the S. of Tasmania, while cold fronts cross Victoria. However, very little rain falls in East Gippsland with this pattern. Fig. 1 shows a typical rainfall distribution.

East Gippsland receives the bulk of its rainfall from depressions centred off the E. coast of Australia. These may have passed through Bass Strait and intensified near Gabo Island, but more commonly, they have developed off the coast of N.S.W. and moved southwards. When the centre is just SE. of Gabo Island, a vigorous southerly airstream is brought to East Gippsland. This air has originated in the Tasman Sea, is warm and moist, and produces very heavy rainfall over most of East Gippsland and particularly between Orbost and Cann River. (See Fig. 2.)

There is no seasonal trend in the occurrence of east coast depressions. Karelsky (1965) has found the number of cyclonic centres in 5° squares of latitude and longitude over the 12 years 1952-1963. (Table 1.)

TABLE 1

NUMBER OF CYCLONIC CENTRES IN 12 YEARS 1952-1963, BETWEEN 35°S AND 40°S

Month	Between Longitudes	
	145°-150°E	150°-155°E
January	9	18
February	2	13
March	3	11
April	7	11
May	12	25
June	11	3
July	10	21
August	8	23
September	14	23
October	10	17
November	7	18
December	8	23
Year	101	206

Not all of these depressions produce heavy rainfall in East Gippsland, as the position of the centre, the intensity, and conditions in the upper atmosphere are all factors determining the amount of rain which falls.

Rainfall

The average annual rainfall over the area is shown in Fig. 3, where the influence of the Snowy River valley can be seen. The driest part of the whole area is found along the valleys of the Snowy and Deddick rivers near the N.S.W. border, where average rainfall is between 25 and 30 inches per year. The mountainous area near Mt. Cobberas, to the W. of these valleys, could be expected to have much higher annual rainfall, probably in excess of 50 inches. The annual average exceeds 40 inches between Cabbage Tree and Cann River and north-

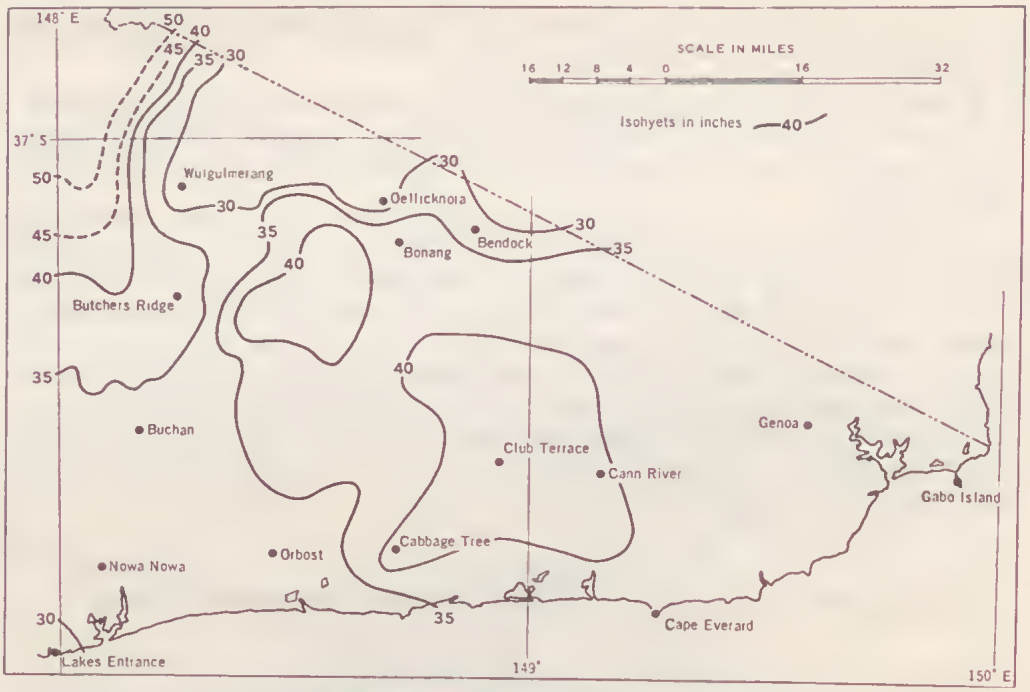

FIG. 3—Average Annual Rainfall—Eastern Gippsland.

wards, and probably also on the higher country between the Brodribb and Snowy rivers.

The variation in the average rainfall through the year is not great, and at the great majority of places, the average rainfall exceeds two inches in each month of the year. There is a slight seasonal maximum in summer in the N. of the area, and a slight winter maximum in the E. This is indicated for two typical locations in Table 2.

TABLE 2

AVERAGE RAINFALL (in inches)

	April-September	October-March
Wulgulmerang	11·41	14·19
Genoa	19·56	17·59

Depending as it does on the incidence of east coast depressions, the actual rainfall can vary considerably from one month to the next. For example, in 1906, Orbost received 0·13″ in February, 10·00″ in March, and 0·92″ in April. The average rainfall is calculated from a small number of high monthly falls and a larger number of low monthly falls.

To illustrate this, the mean and median of monthly rainfall over 53 years in East Gippsland is shown in Table 3. The median is the rainfall which is not exceeded in 50% of occasions. (This district rainfall is the average of the rainfall at the twelve stations: Bairnsdale, Bendoc Park, Bonang, Bruthen, Buchan, Butcher's Ridge, Dargo, Dellicknora, Ensay, Gabo Island, Lakes Entrance and Orbost.

TABLE 3
DISTRICT RAINFALL (inches): EAST GIPPSLAND 1913-65

	Median	Mean
January	1·80	2·47
February	2·05	2·19
March	1·88	2·46
April	2·11	2·46
May	1·92	2·51
June	1·99	2·62
July	1·86	2·40
August	2·05	2·25
September	1·93	2·43
October	2·81	2·94
November	2·36	2·73
December	2·60	2·74

Although some of these places are outside the area under consideration, they form a homogeneous rainfall district). In all months the median is less than the average, and in some by a considerable margin.

However on a seasonal basis, the difference between median and mean is very small except in autumn (Table 4).

The average annual rainfall for the district is 30·20 inches, and the annual rainfall shows less variation from year to year than many other districts of Victoria. The standard deviation of 5·25 inches is 17·4% of the average, compared to a standard deviation of 13·4% of the average in the Western Plains and 28·3% in the northern Mallee.

TABLE 4
DISTRICT RAINFALL (inches): EAST GIPPSLAND 1913-65

	Median	Mean
Summer	7·41	7·39
Autumn	6·80	7·42
Winter	7·25	7·27
Spring	8·02	8·10

At stations with a record of at least fifty years, the annual rainfall has varied from just less than 20 inches to over 50 inches, while 70 inches was recorded in one year at Butcher's Ridge.

Effective Rainfall and Drought

Effective rainfall is defined as the amount of rain necessary to start germination and to maintain plant growth above the wilting point, and has been related to evaporation by Prescott in the formula

$$P = 0{\cdot}54E.^{0{\cdot}7}$$

where P is the effective rainfall and E the evaporation.

Because of the lack of evaporation-recording stations in the area, evaporation has been estimated from the saturation deficit at 9 a.m., and the effective rainfall then calculated.

The chances of receiving rainfall equal to or exceeding the effective amounts for each month of the year have been calculated for a number of places in the area,

and expressed as a percentage frequency of occurrence. This frequency ranges from over 60% in summer to over 90% in winter. Thus there is an almost continuous growing season, and in the highlands growth is limited by low winter temperature rather than by lack of moisture.

At Orbost, two consecutive months of non-effective rainfall may be expected in about 50% of years, and three consecutive months of non-effective rainfall in 10% of years. There has been one occasion of four, and one of five, consecutive months of non-effective rainfall. In most cases, these periods occur in the warmer months of the year.

The definition of drought is extremely difficult as the concept cannot be divorced from the use to which water is put. (Gibbs and Maher 1966).

Foley (1957) used rainfall deficiencies to develop an index of drought and to show the severity and duration of past droughts. The following list of the more intense droughts is based on the rainfall at Sale, Bairnsdale, Maffra, Rosedale and Warragul. Although these are outside the area under consideration, three of the stations have a sequence similar to East Gippsland, of dry and wet years.

Years	Approximate Duration	Months
1882	9 months	Jan.-Sept.
1883-84	10 months	Dec.-Sept.
1885	8 months	May-Dec.
1888	10 months	Apr.-Nov.
1894-95	13 months	Nov.-Nov.
1897-99	19 months	
1908	5 months	Jan.-May
1909-10	11 months	Oct.-Aug.
1911-12	11 months	Aug.-June
1913-16	3 years 2 months	
1922-23	6 months	Nov.-Apr.
1925-26	6 months	Sept.-Feb.
1926-27	10 months	Sept.-June
1932-33	9 months	Sept.-May
1938-39	6 months	Aug.-Jan.
1939-40	11 months	Dec.-Oct.
1943-44	6 months	Oct.-Mar.
1944	6 months	June-Nov.

After a break of twenty years, drought was again experienced in East Gippsland from late in 1964 to the spring of 1965.

As is usually found with the incidence of drought, there is no regularity in its occurrence, and its prediction by statistical means proves impossible.

Rainfall Intensity and Floods

A vigorous east coast depression can cause a large amount of rain to fall in a short space of time. The frequency of 24 hour falls in excess of 3 inches is greater in East Gippsland than in other parts of Victoria. (Table 5).

The most frequent occurrence of this heavy rainfall is in the lower country from Nowa Nowa to Cann River, which receives the full force of a surface depression off the coast. This rainfall frequently causes rapid rises in the short coastal streams such as the Brodribb, the Bemm and the Cann. Heavy rainfall further inland depends on a depression being centred over the land, at least in the upper levels of the atmosphere, and this is a less frequent occurrence. However, the worst floods on

TABLE 5
HIGH 24-HOUR RAINFALLS

Station	Number of 24-hour rainfalls over 3" in 20 years 1947-66	Highest 24-hour rainfall on record (inches)	Month of occurrence of record fall
Bonang	10	4·83	December
Buchan	6	8·45	July
Butchers Ridge	9	9·84	December
Cabbage Tree	16	6·86	January
Club Terrace	11	8·83	October
Delegate River	3	4·50	September
Dellicknora	4	5·00	January
Gabo Island	8	6·64	May
Gelantipy E.	5	4·50	September
Lakes Entrance	7	5·07	May
Nowa Nowa	12	7·78	January
Orbost	7	7·13	December
Brodribb River	9	6·90	March
Sardine Creek	11	4·54	October
Melbourne	3	4·25	January

the Snowy River occur when heavy rain falls over most of the catchment, which extends well into New South Wales.

One of the highest floods on the Snowy occurred in January 1934, when the river reached almost twice the critical height of 17 ft at Orbost and both the bridges at McKillop and Orbost were washed away. Flooding on the Snowy occurs on an average of once or twice a year, and this river can also rise rapidly, e.g. a rise from 3 ft to 23 ft can occur in 24 hours.

Hail and Snow

In southern Victoria, hail is frequently associated with an outbreak of cold southerly air in winter and spring, but it is then usually of small size and does little damage. In summer, the intense convective activity of thunderstorms may produce large and damaging hailstorms.

Because of its local nature, (one hailstorm does not extend for more than a few miles), reliable statistics are difficult to obtain. Orbost has recorded hail on 8 occasions in 10 years, 7 of these being in the winter and spring months. Bendoc in the highlands had recorded hail on 3 occasions in 2 years.

Snow is a rare occurrence over the lower country. It has never been recorded at Orbost, although it has fallen several times at Cann River. Snow falls fairly frequently in winter at elevations over 2000 ft. Bendoc (elevation 2750 ft) has recorded snow 16 times in 2 years, and twice it has fallen as late as October. The mountains, such as the Cobberas (elevation over 6000 ft), would be snow-covered for the winter months.

Temperature

Gabo Island is typical of the equable climate near the coast, the difference between the average maximum and average minimum temperature being only about 10°F in each month of the year. (Table 6). However, even at this island location, century temperatures have been recorded in the summer months, and the temperature has fallen to freezing point in winter.

TABLE 6
AVERAGE AND EXTREME TEMPERATURES (°F)

Station	Altitude (feet)	Data	No. of year of record	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Gabo Island	50	Mean Max. Temp.	50	69·9	70·5	69·6	66·4	62·3	58·5	57·4	58·6	60·7	62·8	65·2	67·7
		Mean Min. Temp.	50	60·1	60·9	59·7	56·2	51·8	48·3	46·5	47·3	49·4	51·9	55·1	57·8
		Highest on record	73	102·5	102·3	101·5	89·0	84·0	83·0	80·0	80·0	85·0	93·0	95·0	101·0
		Lowest on record	73	41·0	43·0	38·0	37·0	33·0	32·0	31·0	32·0	32·0	36·0	34·0	39·0
Orbost	100	Mean Max. Temp.	26	77·3	76·1	74·4	68·5	62·9	58·6	57·9	59·9	63·8	66·8	70·1	74·2
		Mean Min. Temp.	26	54·5	55·3	53·0	48·1	44·1	40·7	39·0	40·1	42·7	46·5	49·7	52·7
		Highest on record	26	108·8	105·1	105·0	94·3	82·9	76·0	71·0	76·7	89·0	93·6	101·8	106·0
		Lowest on record	26	40·0	39·0	38·9	32·0	31·4	28·3	26·4	26·1	27·4	33·1	35·0	38·0
Nowa Nowa	200	Mean Max. Temp.	13	78·9	77·5	76·6	69·4	63·3	58·6	58·1	60·5	64·9	68·2	71·6	75·0
		Mean Min. Temp.	13	52·5	53·8	50·8	46·5	42·3	38·4	35·9	37·4	39·9	44·2	47·9	51·3
		Highest on record	19	109·2	105·8	103·0	91·0	77·0	75·5	69·7	75·0	83·4	91·2	99·6	106·5
		Lowest on record	19	36·5	38·0	36·2	28·1	28·0	23·5	23·4	24·0	25·6	31·0	33·6	38·0
Cann River	250	Mean Max. Temp.	11	78·8	77·1	74·5	69·1	62·0	57·4	56·8	58·9	64·4	67·6	71·4	75·3
		Mean Min. Temp.	11	53·6	54·3	52·3	45·8	41·7	38·4	36·3	37·5	40·8	45·4	48·4	51·9
		Highest on record	16	104·0	107·0	103·2	89·0	76·0	75·2	69·0	74·0	87·0	91·5	98·0	105·0
		Lowest on record	16	37·0	38·0	39·0	31·3	27·4	25·0	26·0	28·0	27·5	31·2	35·5	38·0

The moderating influence of the sea diminishes even only a few miles inland: at Orbost the range between average maximum and minimum temperatures is over 20°F.

The temperature regime is very similar at Nowa Nowa, Orbost and Cann River. All three stations are at elevations of 300 ft and situated 10-20 miles from the sea. The temperature at Orbost exceeds 100°F on one or two days a year on the average, and 90°F on 13 days. (For comparison, the figures for Melbourne are 4 and 19 days respectively).

Light frosts (air temperature less than 36°F) can occur at Orbost during the months April to September, with the average number of occasions per year 30. The temperature rarely falls below 30°F at Orbost, but frequently does so in winter at Nowa Nowa and Cann River.

A feature of the climate of this area is the mild temperatures which can occur on winter days. When northerly winds are blowing over eastern Victoria, particularly if they are bringing rain to the north-east highlands, the dry air descending from the mountains becomes quite warm. This Föhn effect, although not so pronounced as that observed in the European Alps or the Rockies, does cause the temperature to rise to the high sixties or even over seventy degrees. It is not uncommon for this area to have the highest temperatures in the State on these occasions (Fig. 4). Even Gabo Island receives this effect at times, and the temperature has reached 80° there in each of the winter months.

Bendoc, the only station in the highlands, has a period of record too short for precise means to be tabulated. From records over the past four years, the average maximum temperature is in the low seventies in January and the high forties in July. The highest temperature so far recorded is only 92°. The average minimum

FIG. 4—Föhn Effect in East Gippsland—3 p.m. 1 July 1966.

temperature is in the mid-forties in January and below 30° in July. The lowest temperature so far recorded is 16°. Frosts can occur at almost any time of the year, the period with the temperature remaining over 36° being only 2 to 4 weeks, but it remains over 32° for 3½ to 4 months.

Fog

Fog in most of Victoria is usually due to nocturnal radiation, is more common in the colder months of the year, and occurs at night or in the early morning. However fog along the Victorian coast is usually of an advective nature, e.g. when warm moist air moved over colder water.

This happens in the summer months when a northeasterly airstream brings air from the Tasman Sea over Bass Strait, and sea fog occurs off the East Gippsland coast. The coast itself is not always affected and the average number of days of fog at Gabo Island is only two per year, distributed from October to February (Loewe 1944).

At Orbost the average number of days per year is 10, distributed through all months of the year.

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3

The Geology of East Gippsland

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Abstract

Five broadly defined landforms are discriminated in east Gippsland. A mountainous tract is flanked on the N. by extensions of the Monaro Tableland, and on the S. by piedmont downs. These in turn are fringed by a Quaternary dune-swamp complex, and small intermontane basins, largely due to differential erosion, occur within the mountain tract.

Karst features occur in a few areas but the dominant regimen is fluvial. Effects of Pleistocene periglaciation can be discerned on the highest peaks.

The bedrock consists of a complex of tightly folded Ordovician terrigenous sediments, and less strongly folded Silurian terrigenous and carbonate sediments. These are intruded and metamorphosed by a number of latest Silurian or earliest Devonian granitic bodies, of which the largest are the Bega and Kosciusko batholiths.

Early Devonian times witnessed the accumulation of a great thickness of terrestrial sediments, the waxing and waning of acid vulcanism (Timbarra Formation and Snowy River Volcanics), block faulting and planation, followed by a widespread marine incursion and the deposition of the limestone-mudstone complex of the Buchan Group. A period of folding sometime in the Middle Devonian or earliest Upper Devonian (Tabberabberan Orogeny) affected the entire region, and was followed by a further cycle of acid vulcanism (Eden Rhyolites) and essentially continental sedimentation (Merrimbula Group). Further plutonism in late Devonian and late Triassic times is exemplified by the Ellery Granodiorite massif and the syenite-granite porphyry complexes of the Benambra-Mt. Leinster area.

Cainozoic basalts, whose placement reflects generally the mid-Tertiary drainage pattern, occur scattered across the area. Cainozoic sediments are generally restricted to the piedmont-cum-coastal area and are predominantly non-marine, with the notable exception of the Oligocene to Lower Pliocene marine sediments, including limestones, occurring W. of Orbost (Lakes Entrance Formation, Gippsland Limestone, Tambo River Formation and Jemmy's Point Formation).

The incursion reached its maximum in Miocene times. The last events were the deposition of a widespread veneer of sands and gravels in late Pliocene to Pleistocene times (Haunted Hills Gravels) followed in late Pleistocene to Holocene by formation of coastal barriers, lagoons, marshes and alluvial deposits arranged *en echelon* along the coast; these sediments include evidence of a mid-Holocene high sea-level.

The structural evolution of this and immediately adjacent parts of the State is discussed, with particular reference to fault systems and the evidence for wrench faulting not previously noted. The area has been subjected to at least four periods of diastrophism, each of which has produced less intense folding than its predecessor. The Cainozoic was characterized by minor faulting and mild warping.

A brief account is given of the economic geology of the region: minor goldfields in the Bendoc-Bonang, Club Terrace and South Buchan-Mt. Tara areas; small silver-lead mines in the Buchan and Deddick areas; small copper mines at Deddick and Sardine Creek; and iron and manganese shows in the Buchan-Nowa Nowa district. The greatest economic potential appears to lie in the Silurian marbles, the Devonian dolomites and limestones, and the soft Miocene limestones, all of which are present in large bodies.

Introduction

The boundary chosen for the East Gippsland Symposium neatly bisects the region between Buchan, Bindi, Benambra and the Cobberas, where recent investigations have helped to delineate better the Palaeozoic history of the State. The area treated in the present account therefore extends somewhat to the W. of this line, as far as the Tambo R. valley.

The geology and geomorphology of Victoria E. of the Tambo R. was little known until recent years apart from early accounts of reconnaissance by W. B. Clarke (1853), N. Taylor (1866), and by an early government prospecting party led by J. S. Kost (1877). The most prolific early worker was A. W. Howitt (1869-1890) whose activities were confined to the area NW. of a line from Bairnsdale to Bonang. Other prominent contributors were J. Stirling (1884-1899), S. B. Hunter (1897-1898), W. H. Ferguson (1898-1899) and O. A. L. Whitelaw (1898-1921). A useful guide to the scattered literature is given by J. W. Gregory (1907). Since then there have been a number of papers on the Snowy River Volcanics (Samson & Cochrane 1947; Ringwood 1965a, 1965b; Fletcher 1963), and on the following districts: Nowa Nowa (Teale 1920; Bell 1959); Buchan (Talent 1956; Teichert & Talent 1958); Bindi (Gaskin 1943) Mt. Leinster (Broadhurst & Campbell 1933); on Upper Devonian sediments of the Club-Terrace-Combienbar-Buldah area (Spencer-Jones 1967), and on a number of mines in the counties of Tambo and Croajingalong. Relevant studies in adjoining areas are those of P. W. Crohn (1950) for the Omeo district; J. Carne (1897), I. A. Brown (1930, 1931) and L. R. Hall (1959, 1960) for the adjacent part of N.S.W.; E. C. Bird (1965) for coastal morphology of the Gippsland Lakes.

A recent programme of reconnaissance mapping E. of the Snowy R. and more

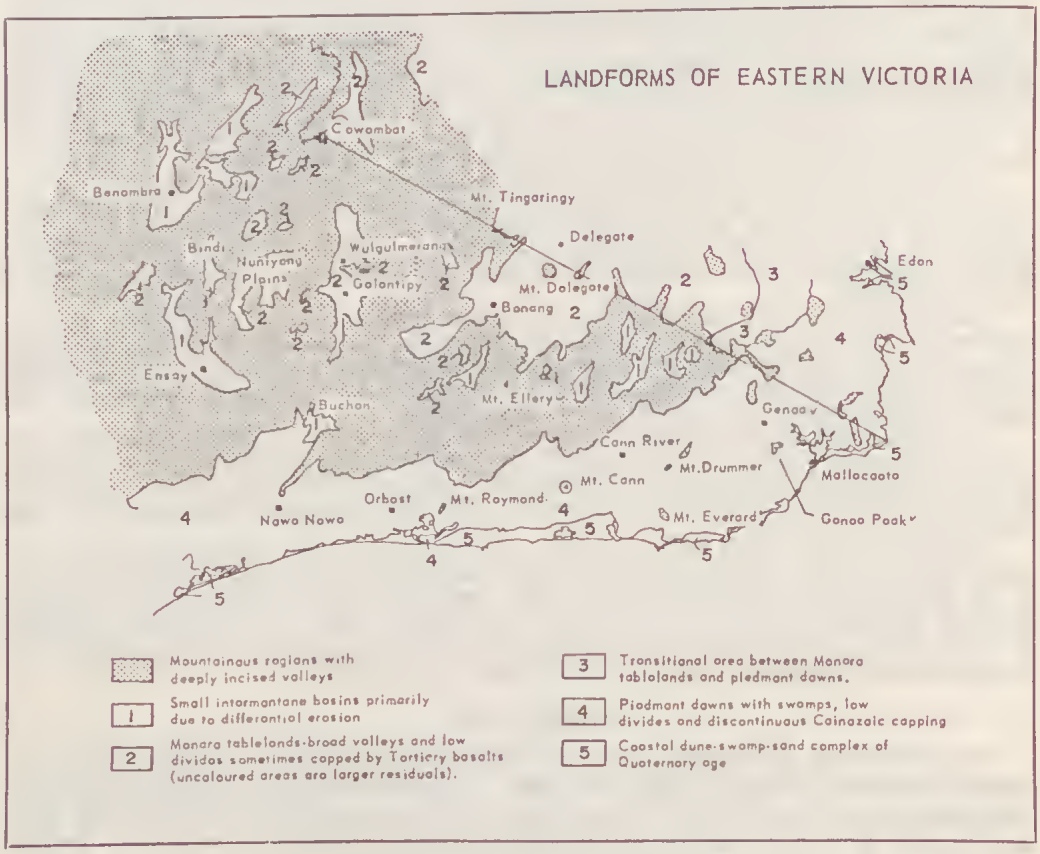

FIG. 1—Landforms of eastern Victoria.

detailed mapping on a scale of 1 mile to the inch of the country between the Tambo and the Snowy rivers has resulted in a clearer understanding of the geology of this part of the State.

Landforms

Five broadly visualized landforms can be discriminated in Victoria E. of the Tambo R.:

1. *Mountainous Tracts*: with deeply incised valleys, concordance of ridge tops often for many miles, and with occasional prominent mountain masses standing above these concordant summit levels as though they represented residuals projecting above a former widespread 'peneplain' or 'peneplains', e.g. The Cobberas, the Bowen Mountains, Mt. Tingiringi, Mt. Ellery and Mt. Elizabeth.

2. *The Monaro Tableland*: extending generally northwards from the mountainous tracts as a gently undulose surface consisting of broad valleys with low divides, scattered mid-Tertiary basalt residuals, and isolated monadnocks, e.g. Mt. Delegate, Wog Wog. A number of rather arbitrarily defined areas of near planar and gently undulose topography bevel the high parts more or less regardless of rock type. These can be construed as outliers of Monaro surface, many likewise including tracts of mid-Tertiary basalts, e.g. the Nunniong-Nunnet tablelands, the Wulgulmerang-Gelantipy-W Tree tablelands, and the gently rolling country N. of The Pilot about the headwaters of the Ingeegoodbee and Moyangul rivers. The Monaro surface falls in a general way SE. from Bombala, merging with the coastal downs in the headwaters of the Towamba and Wallagaraugh rivers.

3. *Piedmont Downs*: a complex of coastal tablelands, subdued ranges, swamps and generally weakly incised streams, though with isolated higher residuals, e.g. Mt. Cann, Mt. Everard, Mt. Raymond, Mt. Imlay and Genoa Peak. Low divides of moderate prominence occur, e.g. the Howe Ranges, the Tableland Hills, and the low ranges about Mt. Drummer. The boundary between the piedmont downs and the mountainous tract is often well defined and has a pronounced *en echelon* trend to the NE. suggesting some possibility of former warping in this direction; this has not been verified to date. There is a discontinuous cover of Cainozoic sands and gravels with probable mid-Tertiary basalts at Club Terrace and South Buchan testifying to the presence of at least some remnants of an earlier Tertiary surface within the complex. Part of the Cainozoic cover is post-Lower Pliocene, since similar beds in extension overlie marine Lower Pliocene sediments about Lakes Entrance. Other parts of the cover are notable for the presence of deep red soils some of which as for example between Cann R. and Cape Everard (E. D. Gill, pers. comm.), appear to have lateritic profiles indicative of a pre-Kalimnan age. In short, within this tract there is evidence for a complex of erosional and depositional surfaces of various Cainozoic ages, stripped and exhumed to varying degrees.

4. *Coastal Dunes*: sands and associated swamp and lacustrine deposits of late Quaternary age distributed *en echelon* along the coast. They include, across the mouths of streams, barriers which are responsible for the development of coastal lakes, particularly Tamboon Inlet, Sydenham and Mallacoota inlets, Lake Tyers, and Wonboyn Lake to the N. The geomorphic history of this region is little known but, like regions further to the W., notably the Gippsland Lakes, it includes the drowning of estuaries and a mid-Holocene high sea-level. This is indicated by dates of 3,780 and 3,560 years B.P. obtained from two superposed samples at Howe Flats, Mallacoota (E. D. Gill, pers. comm.).

5. *Intermontane Basins*: small areas due largely to differential erosion, e.g. Buchan, Bindi (Devonian limestones); Goongerah, Errinundra, Chandlers Creek, Ensay-Swifts Creek (granitic rocks); Cowombat (Silurian mudstones); Combienbar, Buldah (Upper Devonian sediments including mudstones). Earlier workers on adjacent areas of N.S.W. stressed the importance of faulting in the evolution of the landscape, and this opinion is still advocated, though with some reservations, by W. R. Browne (1967) for the highlands extending northwards from the Victorian border. Faulting of the Palaeozoic basement is widespread, but fault control of the landscape and Cainozoic movement along faults is all too often speculative. The dominant land forms are repeatedly explicable as the product of differential erosion, and to this should be added the natural tendency of granitic terrains to weather into linear scarps and depressions.

Minor karst features occur in the areas of Silurian marbles, Devonian limestones and dolomites and Tertiary limestones, more notably in the Limestone Ck-Stony Ck area (Stirling 1884), in the Buchan (Teichert & Talent 1958), Basin Ck, Bindi, Gillingal and Stony Ck (upstream from the Toorloo Arm of Lake Tyers) areas. In all of these the dominant regimen has been fluvial and the karst processes subordinate.

During Pleistocene times the highlands above 4,000 ft, particularly the peaks about the Cobberas, experienced periglacial conditions with developments of rock rivers and the stepping of valleys in association with boulder cascades (Talent 1965a).

Because the Cainozoic history of the area and its geomorphology are intermingled, reference should be made to the Cainozoic section of this paper.

Apart from the restricted plutonism and vulcanism in the Benambra-Mt. Leinster district in late Triassic times, Mesozoic events within the area are not well-known. Hence tectonism associated with this epoch remains speculative. However, the mid-Tertiary basaltic flows furnish a key to some reconstruction of the pre-basaltic relief, giving a measure of subsequent erosion. They provide too, perhaps, a check on the amount of displacement by Cainozoic faulting, now not discriminated over most of the area. At present this would seem the only means of checking the extent of Cainozoic unwarping of the highlands, for which Craft (1933b) arrived at an estimate of no more than 2,000 ft for the Monaro-Kosciusko region.

Stratigraphic Background

The sedimentary and plutonic history of eastern Victoria is complex, with a number of events discernible in different areas. The earliest, affecting the Ordovician basement, are masked by the complex of Silurian and post-Silurian tectonic and plutonic episodes.

No Cambrian rocks have been discovered, though at one stage it was thought that the metamorphic complex of north-eastern Victoria and the Omeo-Ensay district was of Cambrian age (Gregory 1903). With increased regional and detailed mapping, it became apparent that these rocks were in part, if not entirely, metamorphosed Ordovician sediments, originally argillites-cum-arenites. The metamorphic complex has become well known from the pioneer studies of A. W. Howitt (loc. cit.), and studies by C. M. Tattam (1929), P. W. Crohn (1950), and F. C. Beavis (1962), the latter in the Kiewa area. The main metamorphic complex is outside the region under particular attention, but small bodies of similar metamorphic rocks are found E. of the Omeo-Ensay belt: about Mt. Bung, E. of Benambra; about Mt. Misery and in the headwaters of Dead Horse Ck; S. of Davies

Plains; between Mt. Nunniong and Bindi and swinging down on to Junction Ck; as a dividing strip N. of Bentley and Nunnet plains; and as a zone 6 to 10 miles along strike extending S. from the Ellery Granodiorite. W. of Mt. Nunniong the schists and gneisses pass eastwards into lower grade schists and hornfels containing poorly preserved Eastonian graptolites, thus documenting the Upper Ordovician age of these particular metamorphosed sediments. The metamorphic belt extending southwards from the Ellery Granodiorite through Mt. Kuark and Murrungowar reappears as inliers in Cainozoic piedmont deposits, the largest about Mt. Raymond. The belt includes schists, gneisses and granulites as well as granitic bodies, but the most striking rock types are dark, coarse grained non-schistose or poorly schistose metamorphics. The abrupt truncation of this belt by the Ellery Granodiorite suggests tectonic complications of the boundary, or that the metamorphics and their intimately associated granitic bodies antedate intrusion of the Ellery massif. From the relationships between granitic intrusions and metamorphics to the W., one would assume that here too metamorphism took place about the close of Silurian or earliest Devonian times, with some possibility of development during the more indefinite early Silurian diastrophism.

Ordovician

The Ordovician sediments of eastern Victoria consist of a vast thickness of monotonously uniform, rhythmically deposited geosynclinal sediments, predominantly graded (turbidites), with grain size generally in the range of clay to fine sand. Quartz sandstones are uncommon, though they are more prominent further W. in the Myrtleford-Tabberabbera-Bruthen belt, and within the fault-bounded slices of

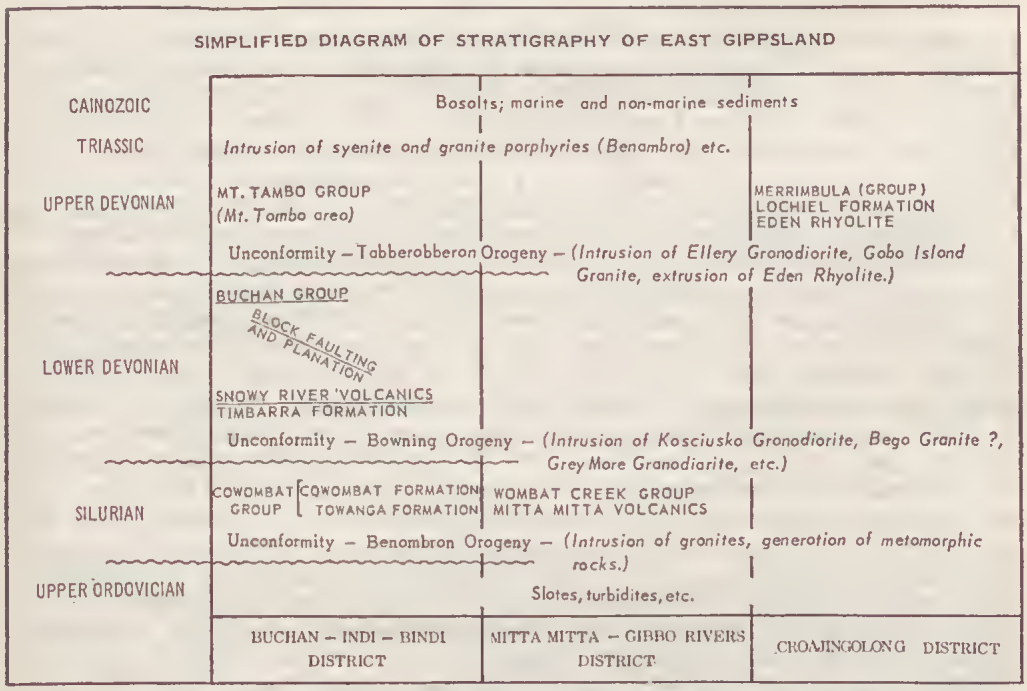

Fig. 2—Correlation chart of the main stratigraphic units of east Gippsland.

east Central Victoria. These quartz sandstones are responsible in the main for the rugged topography of the Bowen Mountains E. from Accommodation Ck, and for the gorge of the Broadbent R. Because of tight folding, the monotony of the sediments, the frequency of faulting and the paucity of fossils, they tend to defy stratigraphic analysis. Slaty cleavage, small scale cross bedding in coarser units, and flute casts are common. Analogues in adjacent N.S.W. are the Adaminaby, Bogong Creek, Bolton and Kiandra beds and their probable equivalents (Moye, Sharp & Stapleton 1963). No tuffs or andesites comparable with those of the Kiandra Beds (Gisbornian) are known.

Upper Ordovician graptolites have long been known from Nowa Nowa, from areas to the N. about Wombat Ck and the Dart and Gibbo rivers, and from E. of the Snowy R. at Cabanandra, Cape Conran, Accommodation Ck (Deddick), Gattamurh Ck and McLaughlin's Ck (cf. Keble & Benson 1939 for refs.). More recently a number of localities have been discovered at Mt. Nunniong, South Buchan, Broadbent R., Barrabilly Ck, and Butcher's Ck. Pre-Darriwilian Da 4 horizons have not been discovered, but wide areas have yet to be examined in detail, so older horizons may well be present. For instance, on the Gibbo R. there is a descending succession to beds containing Da 4 graptolites, which in turn appear to be underlain by a great thickness of unfossiliferous sediments.

Silurian

The stratigraphy of the Silurian rocks of eastern Victoria has recently been summarized in this journal (Talent 1965); it will suffice therefore to indicate only the broadest features.

(1) *Sediments and Lavas*

The oldest unit, the Mitta Mitta Volcanics, lies outside the area under discussion in this Symposium; it consists of often highly fragmental ignimbrites (rhyodacites) with subordinate rhyolites, tuffs and minor tuffaceous sediments. It is overlain by the Wombat Creek Group, a sequence of marine conglomerates, limestones and generally fine grained terrigenous sediments at least 10,000 ft in thickness. One minor conglomerate half a mile upstream along the Mitta Mitta R. from its junction with Wombat Ck contains occasional granitic boulders, testifying to the presence of pre-Wombat Creek Group granites somewhere in the vicinity.

In East Gippsland the same sort of succession outcrops in a series of fault slices between Bindi and the headwaters of the Indi R. where it is known as the Cowombat Group. Silurian sandstones, limestones, marbles and fine-grained terrigenous sediments outcrop in this area from beneath the Early Devonian Snowy River Volcanics, with the fault slices tending in the S. to be radially focused on Bindi. In that area are the main developments of conglomerates (the Mount Waterson Formation) which though isolated by faulting, appear to be a lateral development of the basal unit of the Cowombat Group, the Towanga Formation. This is a unit with vast thicknesses of sandstones and some minor conglomerates and limestones, the latter having yielded poorly preserved fossils of Llandovery or Wenlock age. The succeeding units, grouped as the Cowombat Formation and so named because of the paramount importance of the richly fossiliferous development at Cowombat Plain, contains faunas of late Wenlock to early Ludlow age. Metamorphosed segments of the Cowombat Group cross the Ingeegoodbee R. and pass northwards into N.S.W. along the Suggan Buggan Range.

Silurian sediments are known sub-surface beneath the Snowy River Volcanics N. of Nowa Nowa (Talent 1959b), and from between Martin's Ck and the head of

Sardine Ck, but are better known N. of the border at Quidong, Cooma and areas farther to the N. Particularly at Bindi and in the vicinity of Cowombat Plain, relationships show the Silurian succession to have been folded prior to the extrusion of the Snowy River Volcanics. Relationships in general in the headwaters of the Buehan R. show that the Silurian rocks were intruded by the Kosciusko Granodiorite, and that this had been de-roofed before the onset of the terrestrial sedimentary and volcanic events indicated by the Timbarra Formation and the Snowy River Volcanics. The period of intrusion of the Kosciusko Granodiorite is therefore fixed within the time interval of the latest Ludlow and early Lower Devonian (Talent 1959a).

(2) *Latest Silurian or earliest Devonian granitic rocks*

Although the age of the Kosciusko Granodiorite and its ramifications about the Deddick, Timbarra and Buehan rivers can be fixed with some surety, the age of most other granitic bodies to the E. is not so precisely known. The Bega Granite is demonstrably pre-Upper Devonian in age, being overlain by equivalents of the Merrimbula Group. Extensions of it to the N. bearing other names and perhaps not related to it, such as the Boro Granite, are connected with metamorphism and mineralization of Silurian sediments; it would therefore seem to be of generally the same age as the Kosciusko Granodiorite.

It would seem that the Grey Mare Granodiorite has been responsible for the metamorphism of Silurian sediments adjacent to it along the Indi R. Because of extensive faulting, however, and some uncertainty as to how far the Grey Mare Granodiorite extends to the N., no firm decision can be made whether it is latest Silurian-earliest Devonian or younger. The former age range is favoured on regional grounds. Tentatively the granitic masses at Bonang, Delegate River and Irondoon Range, and scattered among the metamorphics N. and S. of Murrungowar are regarded as being also of this age.

The age of the Bete Bolong diorite intrusions and of the Crowstick and Barrabilly diorites in the N. is not definitely known, but is thought to be either latest Silurian to earliest Devonian, or, at the latest, late Middle Devonian to early Upper Devonian.

The fold pattern of the Ordovician basement is to some degree fan-wise, striking approximately NW. to NNW. in the watersheds of the Mitchell, Wentworth and Nicholson rivers, more or less N. in the watersheds of the Gibbo and Buckwong rivers, and with a common trend slightly E. of N. in the watershed of the Snowy R. This fold pattern is therefore disharmonic with the fan-wise arrangement of the Silurian, which trends NW. along the Mitta Mitta R., NE. in the Limestone Creek-Indi River Area (though swinging progressively northwards to the N.), and becoming more easterly eastwards from Bindi. Care is thus necessary in attributing various fracture and shear patterns within the metamorphic belt to a given tectonic episode, using such evidence alone.

Devonian

(1) *Snowy River Volcanics and Timbarra Formation*

Thick sequences of non-marine conglomerates, sandstones, siltstones and minor ignimbrites at least 5,000 ft in thickness constitute the Timbarra Formation, which rests unconformably on the Kosciusko Granodiorite and is overlain by the Snowy River Volcanics. It occurs principally to the W. of Buchan and to the W. of Wulgulmerang (Fletcher 1963; E. R. Woodford, unpub.). Subsequently the Snowy

Limestone Creek, Murendal River. (*A. W. Howitt, 1876*)

River Volcanics complex of more than 10,000 ft of rhyodacites and tuffs with subordinate rhyolites, andesites, keratophyres and basalts accumulated over much of Victoria E. of the Tambo R. The sequence has obviously thinned to a few hundred feet of ignimbrite (rhyodacite) at Errinundra where it occurs interbedded between marine terrigenous sediments below, and limestones correlated with the Buchan Caves Limestone, above. The maximum thickness preserved is in the Wulgulmerang area where the sequence is terminated by tuffs, red beds sometimes with pisolith horizons (Whincup 1947), prominent conglomerates composed mainly of rounded volcanic boulders (Boundary Creek Conglomerate of Ringwood 1955), and with a minor development of trachyandesite (Joplin 1964). A more detailed account of the Snowy River Volcanics succession can be found in the works of Teale (1920), Gaskin (1943), Cochrane & Samson (1947), Ringwood (1955a and b), Fletcher (1965) and Bradley (in press).

(2) *Buchan Group*

Evidence from Bindi, best seen at Mt. Waterson, shows that the Snowy River Volcanics and the underlying Cowombat Group were subjected to epeirogenic block faulting with planation prior to deposition of the Buchan Group, since the lowest unit of this Group rests on the planed surfaces of blocks of Snowy River Volcanics and Cowombat Group sediments (Talent 1965). The same epeirogenic event and planation is apparent in the Buchan area (see discussion under tectonics) and is probably the main reason for the Buchan Caves Limestone resting on different units of the Snowy River Volcanics in different outliers, though the Limestone nowhere rests on the youngest unit of the volcanics, the Wulgulmerang Tuffs. However, the possible lenticularity of the volcanic units must be considered. Yet despite this tectonism, there is remarkable uniformity in lithologic and faunal succession between the various outliers of the Buchan Caves Limestone scattered

between Buchan, Bindi, the Indi R. and Errinundra, suggesting original deposition on a near planar surface termed the Buchan-Indi-Combienbar Shelf (Talent 1965). This term was coined to stress this remarkable homogeneity, in the face of recurring statements in the literature that Middle Devonian sedimentation took place in isolated basins. Such an idea originated apparently with a misreading of Howitt, who repeatedly referred to the physiographic expression of these calcareous areas as basin-like, but who recognized them as formerly connected, and deposited 'at a distance from land in seas of moderate depth' (Howitt 1876, p. 209). The preservation of these disconnected bodies is due to a combination of folding and faulting.

For accounts of the stratigraphy and palaeontology of the Buchan Group reference should be made to the publications of Teichert & Talent (1958) and Talent (1965). In the latter publication the Pyramids Member was regarded as being late Emsian or Eifelian and the overlying Murrindal Limestone more probably Eifelian. Later work by Philip (1966) on conodonts would suggest slightly earlier ages with the Murrindal Limestone not extending up to the Eifelian.

Deformation of the Lower to early Middle Devonian sequences of south-eastern Australia took place principally in the interval between the close of the Eifelian and some time early in the Upper Devonian (Tabberabberan Orogeny). This was followed by intrusion of the Ellery Granodiorite which metamorphosed the Lower Devonian to early Middle Devonian succession at Errinundra, and has not affected the overlying Upper Devonian succession. The Gabo Island Granite is referred to the same epoch; it has been shown to intrude the Eden Rhyolite, but is overlain unconformably by arkosic conglomerates and sandstones of the Merrimbula Formation (Hall 1959).

(3) *Upper Devonian*

The Upper Devonian sequence in eastern Victoria is characterized by predominance of terrigenous sedimentation over rhyolitic and basaltic vulcanism. The succession is best known in the Eden district where the Eden Rhyolite, a sequence of over 1,000 ft of rhyolites, ignimbrites and agglomerates differing petrologically from the Snowy River Volcanics, is overlain unconformably by the Lochiel Formation, up to 1,400 ft of basalts with subordinate rhyolites, arkoses, conglomerates, sandstones and red shales. The unit thins to the S. and is lost in the vicinity of Eden, where it is overlapped by the Merrimbula Formation. This latter consists of at least 2,500 ft of arkosic conglomerates, arkoses, sandstones, siltstones and shales; part of the succession at Eden has yielded a meagre marine fauna dominated by *Cyrtospirifer* and *Cyphototerorhynchus*, indicating a Frasnian and probably late Frasnian age. SW. and S. from Eden the Merrimbula Group outcrops as a series of outliers, the main belt extending through Wonboyn and into Victoria at Cape Howe and Mt. Carlyle. Outliers at Mt. Imlay and Timbillica help to establish the former continuity of this succession with the four *en echelon* outliers in Victoria: along the Genoa R. (known as the Genoa River Beds), Buldah, Combienbar and Club Terrace. All these owe their preservation to structural factors (Spencer-Jones 1967).

The Mt. Tambo Group, outcropping in a belt extending from Mt. Bung through Mt. Tambo to Mt. Shanahan near Bindi, consists of 10,000 ft or more of well-bedded reddish to purplish shales and sandstones, with conglomerates up to 40 ft thick. The sandstones and coarser sediments are poorly sorted and commonly cross-bedded reddish to purplish shales and sandstones, with conglomerates up to 40 ft bedded; arkoses are not infrequent, as for example at Mt. Shanahan. The Group is

unconformable on the Omeo Schists and Gneisses to the E., faulted against the Snowy River Volcanics and Buchan Group to the SE., and on the W. it has been intruded by The Sisters Granite Porphyry.

Triassic

The landscape about Benambra is dominated by inselbergs and rugged hills of syenite and trachyte together with more subdued hills of granite porphyry. The granite porphyries and syenites with transitional types have been grouped as one igneous cycle (Crohn 1950). Evidence from a number of localities, such as Mt. Little Tambo, suggests that granite porphyries and syenites have intruded the trachytes. The syenites and associated intrusions were formerly regarded as Upper Devonian or early Carboniferous in age, but a K/Ar date has shown them to be of late Triassic age (McDougall 1965).

There is no evidence for igneous or tectonic activity during the remainder of the Mesozoic or early Tertiary.

Cainozoic

Cainozoic basalts occur scattered across the area between Bonang, South Buchan and Gibbo River, with the largest masses responsible for the tablelands about Gelantipy-Wulgulmerang and the Nunniong-Nunnet plains. A *Cinnamomum* flora found in association with one outlier on the Deddick road between Little River and McKillop's Bridge is evidence for a mid-Tertiary age for these basalts, though with some qualification because of the persistence of this flora, broadly defined, until later Tertiary (Gill 1952). With the exception of the Morass Creek basalts N. of Benambra, all of these scattered Cainozoic basalts occur as outliers. This indicates that they formerly occupied a much greater area, extending down the Mitta Mitta gorge and for some distance up the valley of Wombat Ck. The Morass Creek basalts lack eruption points: features formerly regarded as such are in fact inliers of Silurian bedrock, and the basalts are remnants of stagnant surfaces being reduced by Morass Ck and the Gibbo and Mitta Mitta rivers. Small outliers of basalt near Club Terrace, from their physiographic situation, are clearly to be regarded as mid-Tertiary in age. Mapping of small outliers of basalt S. and W. of Buchan (Fletcher 1963) has helped demonstrate that the pre-basaltic drainage for much of this area was probably, as now, directed N.-S. Outliers farther N. indicate an ancestral Buchan R. more or less in its present situation, with a large tributary from Nunniong Plains in the W. The same N.-S. alignment is shown by the Wulgulmerang-Gelantipy-W Tree basalts. Basalts at a lower level near the Snowy R. suggest an ancestral Snowy valley more or less in its present situation as far back as mid-Tertiary times.

The Cainozoic succession about Lakes Entrance and to the W. is well known from the works of Carter (1964), Bird (1965), Jenkin (1968) and Hocking & Taylor (1964). The latter refer to the coastal area E. from Lakes Entrance and from it inland up to 6 miles, as the 'Lakes Entrance Platform'. Initial marine Cainozoic transgression over the platform consists of micaceous and sidcritic sands with basal gravels passing up into glauconitic sandstone and in turn to dark micaceous, often sandy, marl. This unit, the Lakes Entrance Formation, is of Oligocene and possibly uppermost Eocene age, and is of the order of 150 ft thick in the vicinity of Lake Tyers (Hocking & Taylor 1964). It is overlain by the Gippsland Limestone of Miocene age which forms prominent outcrops in cliffs along the two arms of Lake Tyers at Toorloo and S. of Nowa Nowa, at Hospital Creek (Tildesley R.), and on the W. side of the Snowy R. about Orbost. A decline in

carbonate sedimentation and an influx of terrigenous sediments is found in the succeeding latest Miocene beds known as the Tambo River Formation, representing an early phase of marine regression. This unit is known as far E. as Lake Tyers but has not yet been found further E. Marine sedimentation continued to contract towards the Lakes Entrance district with a last marine Tertiary unit, the Jemmy's Point Formation, consisting of calcareous sands and silts passing upwards into lagoonal sediments of the Myerimalang Formation (Wilkins 1963). These in turn doubtless grade landwards into the later Pliocene-to-Pleistocene Haunted Hills Gravels which, loosely defined, extend as a veneer northwards to Buchan, eastwards to Mallacoota, and into N.S.W. about Timbillica and Cape Howe. Evidence from the elevation of marine shell beds at various localities in the Gippsland Limestone shows that these sediments have been mildly upwarped landwards to as much as 180 feet near the Colquhoun granite quarry (Wilkins 1963). The same upwarping is reflected in the way each of the Tertiary formations dips seawards [allowance being made for initial dip].

The Pleistocene and Holocene history of the area E. of Lakes Entrance is not well known, but the work of Jenkin (1968) and his predecessors provides a detailed account of areas to the W.; this would be the basis from which the coastal history to the E. would be judged. No attempt is here made to establish a sequence of events in the development of coastal barriers, lagoons, marshes and alluvial deposits in this area; these deposits are arranged in *en echelon* fashion, the more notable developments occurring about the mouths of the Snowy, Bemm, Cann, Thurra and Genoa rivers. A mid-Holocene high sea-level recognized at many localities farther W. is exemplified by dates of 3780 and 3560 years B.P. obtained for two superposed shell beds at Howe Flats E. of Mallacoota (E. D. Gill, pers. comm.).

Attention is drawn to the deep kaolinization of the granitic rocks of the area, readily appreciated in cuttings on the Princes' Highway, and to possibly lateritic profiles developed on Cainozoic sediments such as those along the Cann River-Cape Everard road. E. D. Gill (pers. comm.) has pointed out the significance of these for possible discrimination of his (Gill 1964) mid-Tertiary Nunawading and Lower Pliocene Timboon terrains.

Structure

A region of anastomosing lanceolate and deltoid fault blocks occupies an area centred on Buchan. A series of major faults fans out from Nowa Nowa towards Bindi in the NW. and Bonang in the NE. The same arcing pattern is interrupted by Triassic granitic and syenitic intrusions about Benambra, but extends beyond this, passing to the N. and NW. into a region of generally less spectacular rhomboidal fault blocks indicative of a generally more homogeneous stress pattern. To the NE. the pattern of lanceolate fault blocks becomes more attenuate as it passes northwards towards Tumut and Canberra. The structural pattern is less clearly known E. of the Bonang Highway for in this area there is a general lack of the wide variety of Silurian and Devonian sedimentary and volcanic units that have enabled deciphering of the broader tectonic history of the area to the W.

A. The Snowy River Volcanics Belt and Areas to the North

The tectonic history of eastern Victoria can be deciphered in more detail in the areas in, and adjacent to, the Snowy River Volcanics belt, the Mitta Mitta Volcanics belt, and the area about Benambra, for in this area the multiplicity of stratigraphic units and igneous bodies enables the sequence of tectonic, stratigraphic, volcanic, plutonic and palaeogeographic events to be sorted out.

Broadly speaking, Bindi is the focal point for convergence of a number of arcing fault systems. The Indi Fault from the NE. swings southwards as it crosses the Tambo River N. of Bindi, and then swings progressively towards the SE., heading approximately in the direction of Buchan. It is poorly known S. of the Junction Creek-Little River Divide, though reconnaissance mapping seems to indicate that the intensity of movement was dissipated in a series of parallel faults. But along the same trend about 12 miles to the SE., near Mt.Gilgroggin at the junction of the Timbarra R. and Wilkinson Ck, the mapping of Fletcher (1963) has documented a fault boundary between the early Devonian Timbarra Formation and Ordovician sediments on the W. The same fault boundary then swings slightly W. of S. in the general direction of Lakes Entrance until lost beneath the Cainozoic cover of the coastal downs.

Net movements along the Indi Fault during the Tabberabberan deformation resulted in downthrow to the E. and preservation of the vast thickness of the Silurian Cowombat Group, early Devonian Timbarra Formation, early Devonian Snowy River Volcanics, and late Lower Devonian Buchan Group. All these units were completely removed from adjacent parts of the upthrown block to the W. prior to deposition of more than 10,000 ft of Mt. Tambo Group sediments. That all these units were removed and that the Upper Devonian sediments on the westerly block now rest directly and unconformably on metamorphics and Ordovician sediments is an impressive measure of the displacement along this fault and the erosion that occurred during roughly Middle Devonian times. Preservation of the Mt. Tambo Group, on the other hand, is sound evidence for a reversal of movement on the fault at some time since the Devonian. Part at least of a westerly block was downthrown and the Mt. Tambo Beds stripped from the easterly block. Needless to say, there must have been formerly some Mt. Tambo Beds on the easterly block, for they are truncated by the Indi Fault. Nevertheless, the overall displacement in relation to Tabberabberan and later, presumably Kanimblan (Lower Carboniferous) movements, was one of downthrow to the E.

Evidence is lacking for the existence of the Indi Fault prior to deposition of the Buchan Group in late Lower Devonian times, but the harmony of its trend with

Junction Buchan and Murendal Rivers. (*A. W. Howitt, 1876*)

that of a system of faults sweeping south-westerly from the upper Buchan R. towards Bindi is apparent. This fault complex includes the Hell's Hole, Carrabungla and Reedy River Faults (Talent 1967) and, though the pattern of faulting E. of Bindi is known in broad fashion only, the system as a whole sweeps in towards Bindi, jumbling blocks of Cowombat Group (Silurian), Snowy River Volcanics (early Devonian) and, further out, blocks of schisted Ordovician sediments and granitic rocks of presumed early Devonian (pre-Snowy River Volcanics) age. And yet the lowest unit of the Buchan Group was deposited indiscriminately over the planed surfaces of these blocks (Talent 1965), testifying to post-Snowy River Volcanics, pre-Buchan Group block faulting and planation. It seems reasonable to assume that the parallel Indi and Bindi faults to the N. and S. were in existence at that time and that it was these latter only of the system which were involved in subsequent displacements. As far as stratigraphic evidence is concerned, there would be no grounds for inferring pre-Middle Devonian movements along the Bindi Fault, but its intimate associaton with the whole system of the Indi, Hell's Hole, Carrabungla and Reedy River Faults leads one to assume pre-Buchan Group movements as well as movements in the Tabberabberan and Kanimblan diastrophic epochs. The post-Palaeozoic igneous activity of the Benambra district, now dated as late Triassic (McDougall 1965), is associated with relatively minor tectonic disruption. There is a general concordance of trachytes associated with the syenites scattered over an area of about 100 square miles, the coarser plutonic rocks of this association as it were exhumed, though retaining remnants of trachyte 'skin'. Though the example is small and the tectonic pattern obscured by alluviated valleys and poor outcrops between the igneous masses, one is led to the tenuous conclusion that this area has not been dislocated on anything like the scale involved, for instance, in the downthrow and preservation of the Mt. Tambo Beds along the Indi fault. A still more tenuous conclusion is that large scale fault movements had ceased in this area by late Triassic times.

N. of Benambra the Mitta Mitta Volcanics and Wombat Creek Group outcrop within an attenuate fault-bounded strip, structurally a graben but no longer presenting this physiographic form. The bounding Wombat Creek and Morass Creek Faults converge towards the foothills of The Brothers NE. of Benambra, where their presence is doubtless indicated by Silurian sediments about Pyle's Deposit. These large scale faults have not been detected further S. in the Mt. Tambo-Sisters region of Upper Devonian sediments and Triassic igneous rocks. These would appear to conceal the extension of these faults and thus to set an Upper Devonian upper limit for appreciable movements along them. On the other hand, their trends line up well with the southward to south-easterly swing of the Indi Fault about Bindi and accordingly they could be assumed to have been confluent. Once again, the evidence indicates more profound faulting before the Upper Devonian than during or after Upper Devonian times.

A number of moderate to large scale faults have been detected bounding or within the Snowy River Volcanics belt in the general vicinity of Buchan and Gelantipy, strewn across the area between the Timbarra and Yalmy rivers. The major pattern is a N. to NE. directed fan, the most westerly already discussed as a probable extension of the Indi Fault, and the most easterly the Yalmy Fault, along which the Devonian sequence has been downthrown against an easterly block of Ordovician sediments on which Silurian or Devonian units are lacking for some miles. The Yalmy Fault and its prominent crush zone would therefore appear to be one of the major structural features of eastern Victoria.

Mapping of the Ordovician enclaves within the Snowy River Volcanics belt

PATTERN OF IGNEOUS INTRUSIONS AND LARGER SCALE FAULTS IN EASTERN VICTORIA

Fig. 3—Pattern of igneous intrusions and larger scale faults in eastern Victoria.

about Nowa Nowa (most recently by Bell 1959) and the discovery by drilling of Silurian sediments beneath the intervening strips of Snowy River Volcanics (Talent 1959) reveal the enormity of fault displacements in this area. Further N. along the strike of these faults there is an obvious contrast between the deformation and scale of faulting within the Buchan Group, which there lies as a drape over the jigsaw of fault blocks. This contrast has been adduced as evidence for block faulting and planation of the Snowy River Volcanics prior to deposition of the Buchan Group, an event more readily discernible at Bindi (Talent 1965). Northwards from East Buchan, fault blocks of Ordovician sediments and granitic rocks about Mt. McLeod and on the New Guinea Road near Butcher's Creek show the continuing importance of displacements by faulting within the Snowy River Volcanics belt (Bradley, in prep.). Two easterly directed tongues of Snowy River Volcanics extend across the Snowy River towards Bonang, the more northerly including the Bowen Mountains about Deddick, and the southerly occupying much of the watershed of the Roger R. Though the northerly margin of the Mt. Deddick tongue appears to be in essence a normal unconformable contact with Ordovician sediments and earliest Devonian or latest Silurian granitic rocks, the intervening tongue of Ordovician sediments and granitic rocks in the valley of the Snowy R. about Campbell's Nob and eastwards up the watershed of the Broadbent R. is largely controlled by faulting. This is particularly apparent near the mouth of the Broadbent R. where thin slices of Ordovician sediments are interleaved with slices of Snowy River Volcanics. The main E.-W. boundaries of the Volcanics N. and S. of the Broadbent River are faults; these E.-W. structural trends are repeated N. of Gillingal and N. of Timbarra where N.-S.-striking belts of Snowy River Volcanics and an attenuate strip of Buchan Caves Limestone are cut off at right angles by E.-W. faults (Fig. 3). The occurrences of limestones within the Snowy River Volcanics belt at Gillingal, Jackson's Crossing, Butcher's Creek and at the Murrindal or Hume Park lead mine are all associated with faults.

B. East of the Snowy River Volcanics Belt

For pre-Upper Devonian plutonism and tectonism E. of the Bonang Highway and E. of the Snowy R. in adjacent N.S.W., evidence is scattered. At Errinundra (Thomas 1947) a sequence of tuffaceous sediments and ignimbrites overlain by limestones contains fossils that, despite poor preservation, strengthen the analogy with the Snowy River Volcanics and Buchan Group farther W. These Lower Devonian units were folded into a syncline and down-faulted prior to deposition of Upper Devonian sediments of the Club Terrace-Bemm River outlier. The relationships of the Silurian marbles and conglomerates between Martin's Ck and the head of Sardine Ck to the Ordovician bedrock of eastern Victoria is not known, but at Quidong, between Delegate and Bombala, a gently folded Silurian succession is faulted against, but also demonstrably unconformable over, tightly folded Ordovician sediments. Other scattered occurrences of Silurian sediments to as far E. as Bendethera near Moruya indicate the former widespread and presumably continuous Silurian seas over the entire area, and presumably everywhere essentially unconformable with the previously folded Ordovician succession. The preservation of these scraps of Silurian and Lower Devonian seems to be everywhere connected, at least in part, with major faulting.

Small tectonic basins preserving Upper Devonian sediments at Combienbar, Buldah and Club Terrace bear witness to the existence of a number of strong N.-S. post-Devonian faults (Spencer-Jones 1967). These faults and the attitudes of the basins indicate the presence of a major wrench fault, the Combienbar Wrench, in

which the north-westerly block has moved upwards and to the NE. relative to the south-easterly block in which the Upper Devonian sediments have been nipped in and preserved. The Berridale Wrench extending from Disaster Bay north-westerly through Berridale towards Kiandra (Lambert & White 1965) seems to be conjugate with the Combienbar Wrench.

A further wrench with lateral translation of 3 to 4 miles, here termed the Tombong Wrench, is postulated as sweeping up northwards from this vicinity of Mt. Jack through Goongerah; it would thus account for the apparent northerly migration of a western sliver of the Ellery Granodiorite. Extension of this line to the NNE. into N.S.W. would pass through Tombong and close to the W. side of the Quidong Silurian outlier where there is known structural complexity, and serpentinites and other sheared rocks are present (Relph & Wynn 1960). The trough at Quidong contains Silurian sandstones passing up into shales and limestones, and another between Tombong and Delegate contains Silurian or Devonian sandstones; these can be regarded as large scale synforms produced in part as a result of lateral translation along this line, the more westerly block riding northwards (dextrally) relative to the more easterly block. A small body of granite between Mt. Koolabra and Bendoc may be a fragment torn from the Delegate River intrusion by the wrench. The southerly extension of the wrench could well sweep down and form part of the western margin of the Mt. Kuark-Murrungowar metamorphic belt. The mapped outline of the Ellery Granodiorite suggests a fault, downthrown to the E., passing through the pluton and forming the eastern boundary of the Mt. Kuark-Murrungowar metamorphic belt.

Dislocation of the Ellery Granodiorite would be evidence for post-Upper Devonian movement along the Tombong Wrench, but the magnitude of possible older movements cannot be determined from the stratigraphic units located along its presently known extent. The Tombong Wrench, viewed simply, could well extend beneath the Monaro basalts to join with the Murrumbidgee Fault system and so to Canberra (cf. Canberra 4 mile Sheet, Bureau of Mineral Resources). Likewise the Combienbar Wrench, if projected N., could join in some way with the Shoalhaven Fault system.

The bedrock E. of the Bemm and Combienbar rivers is largely made up of two N.-S. tongues of granodiorite divided by a narrow belt of Ordovician terrigenous sediments averaging 6 to 10 miles in width. The granitic tongues join near the border SE. of Nungatta, though the belt is echoed further N. by a thin screen of Ordovician sediments W. of Towamba. The western margin of the Ordovician belt is faulted E. of Mt. Drummer on the Princes' Highway. The general northerly trend of this fault sweeping up the boundary between the Bega Batholith and the Ordovician sediments is the same as those bounding the Upper Devonian outliers farther west. It may have originated earlier, but can be reasonably assumed to have, like them, experienced appreciable movement during the post-Devonian (?Kanimblan) era of wrenching.

The Upper Devonian sediments N. of the border in large measure owe their preservation to faulting. The eastern bounding fault of the Platts-Maharatta enclave extends towards the Victorian border as the western boundary of the Bega Batholith. The Upper Devonian outlier at Mt. Timbillica appears to be truncated by faulting to the N. and S. Even allowing for unconformities between the Eden Rhyolite, the Lochiel Formation and the Merrimbula Group about Eden, the pattern of mapped outcrops (Hall 1959) seems to indicate that the problem there too, may be complicated by block faulting, e.g. NE. of Towamba in the vicinity of the Sugarloaf goldfield.

The overall pattern of the various Devonian enclaves E. of the Bonang Highway thus emphasizes the magnitude of the post-Devonian tectonic movements in their vicinity. It seems reasonable to assume that intervening areas now lacking such distinctive markers have not escaped comparable tectonism.

C. Cainozoic Movements

Evidence of Cainozoic tectonic movements in the area is far from widespread. None of the Cainozoic basalts of the Wulgulmerang-Gelantipy-W Tree, Bonang, Nunniong-Nunnet or Morass Creek areas show obvious disruption by faulting. Basalts within the valley of the Snowy River E. from, and at a lower level than, those at Wulgulmerang may be construed on casual appraisal to owe their reduced elevation to later Cainozoic faulting, but evidence for this is otherwise absent. These mid-Tertiary, approximately Oligocene, remnants seem rather to be related to an older, less incised valley of the Snowy R., and are perhaps of more interest as a yardstick for appreciating the rate of excavation of the gorges of the Snowy R. through resistant Snowy River Volcanics to the S.

On the present evidence the cause of the abrupt seaward swing of the marine Tertiary boundary in the Orbost-Marlo area could be explained either by warping, or by irregularity of the shore line in Miocene times. The history of Cainozoic warping, particularly in Plio-Pleistocene times, westwards from Lakes Entrance and in a general way parallel to the margins of the Gippsland Basin is given by Jenkin (1968). While the importance of structure within the Gippsland Basin has become well known, it could be said that theories of warping of the highlands with consequent influx of terrigenous sediments have been over-emphasized at the expense of climatic change, particularly with regard to the widespread, predominantly Plio-Pleistocene 'torrent gravels'. The deposition of the 'gravels' is so extensive and relatively abrupt that it is difficult to visualize it as resulting from block faulting and doming and rejuvenation of streams. The focus of maximum uplift was over 100 miles N. of the present 'torrent gravels' sheet, and the elevation involved in that area was no more than about 2,000 ft since approximately Oligocene times, the pre-basalt relief of the Monaro-Kosciusko region being no more than 3,500 to 4,500 ft according to Craft (1933b). Rather, the 'torrent gravels' give the impression of having been distributed across the piedmont areas by streams wandering about like so many loose hoses with greatly augmented flow—the products of a pluvial cycle or cycles.

Some fault movements in Cainozoic times can nevertheless be documented: the Tawonga Fault over-riding river gravels (Beavis 1960); the small horst at Benambra damming Lake Omeo; the Buenbar Fault responsible for gorges on the Gibbo R., the Murray Gates gorge at Tom Groggin, the Devil's Grip gorge on the Swampy Plains R., and the extensive alluvial flats upstream from the fault at Beloka, Buenbar, Tom Groggin and Geehi. However, such Cainozoic movements have yet to be documented in the highlands E. of the Tambo R. The Tara Range may owe its prominence to Cainozoic faulting; the abrupt seaward swing of the marine Tertiary margin about Orbost may be the expression of a warp. These questions remain open.

Sequence of Tectonic Events

1. Tight folding of the Ordovician terrigenous sediments along axes trending between NW. and slightly E. of N. in early Silurian times.
2. Intrusion of granitic rocks in early Silurian times, and presumed generation of the Omeo Schists and Gneisses.

3. Extrusion of the Mitta Mitta Volcanics.

4. Deposition of the essentially terrigenous Cowombat and Wombat Creek Groups and their equivalents, the Quidong Group of N.S.W., with shoreline somewhere to the N. and NW. of Bindi.

5. Period of folding (Bowning Orogeny) producing a more widely spaced fold pattern than that produced during the early Silurian diastrophism; this pattern is fan-wise and disharmonic with that produced previously in the Ordovician sediments.

6. Intrusion of the Kosciusko Batholith and, almost certainly, of the Grey Mare, Bega, Irondoon, Murrungowar, Delegate and Marengo acid intrusives; presumed period of formation of the Mt. Kuark-Murrungowar metamorphic belt.

7. Deposition of the Timbarra Formation and accumulation of the Snowy River Volcanics following de-roofing of at least the Kosciusko Batholith.

8. Earliest discernible movement on the Indi, Bindi, Hell's Hole, Carrabungla and Reedy River Faults, the East Buchan Fault System, and presumably the Yalmy Fault.

9. Planation, followed by deposition of the Buchan Group after subsidence of the Buchan-Indi-Combienbar Shelf.

10. Period of folding (Tabberabberan Orogeny) producing broad regional folds in the Snowy River Volcanics with minor tighter folding in the less competent units of the Buchan Group. This event occurred post-Eifelian, pre-sometime in the early Upper Devonian. Movements along some major faults, best known for the Indi Fault. Certain older faults, e.g. Carrabungla and Hell's Hole Faults, suffered no displacement in this or later diastrophic events.

11. Post-orogenic plutonism typified by the Ellery Granodiorite and the Gabo Island Granite; this event was in part contemporaneous with those of 12, the Gabo Island Granite being presumably consanguinous with the Eden Rhyolite.

12. Widespread terrigenous sedimentation (Merrimbula and Mt. Tambo Groups) following the acid and basic vulcanism in the E. (Eden Rhyolite, Lochiel Formation), though perhaps not extending into Victoria.

13. Diastrophism resulting in appreciable movements along the Combienbar and Tombong Wrenches, presumably responsible in a general way for the generation of the synclinal bodies of Upper Devonian sediments about Combienbar, Buldah, Club Terrace and Genoa River. Tilting of the Mt. Tambo Beds and renewed movements, presumably soon afterwards, along the Indi Fault, causing reversal of previous movements with downthrow to the W.

14. Intrusion of the granite porphyry-syenite complex of the Benambra-Beloka-Marengo area in late Triassic times.

15. No record of events from Jurassic to Lower Tertiary times.

16 a. Downwarping and marine incursion over the Lakes Entrance Platform commencing in Oligocene or latest Eocene times and reaching its maximum extent in Miocene times.

b. Extrusion of Tertiary (?Oligocene) basalts down valleys oriented broadly the same way as present drainage..

17 a. Regression of the Tertiary seas in latest Miocene and Lower Pliocene times, doubtless fringed by non-marine terrigenous sediments, these advancing with retreat of the sea to form the Haunted Hills Gravels.

b. Movements along the Buenbar and Tom Groggin Faults; uplift of the Benambra Horst, damming Lake Omeo; minor upwarping near the coast.

18 a. Periglaciation of the highest peaks at some time or times during the Pleistocene.

b. Formation of the lunette-alluvial-swamp-sedimentary complex about Lake Omeo and Morass Creek.

c. Formation of older river terraces and alluvial fans e.g. along the Tambo R. about Swift's Creek.

d. Formation of the inner barrier of the Gippsland Lakes, and undefined shoreline accumulations further E.

19. Formation of the Holocene dune-swamp-sand-alluvial complex along the coastal fringe; associated with this is evidence of a mid-Holocene high sea level.

Economic Geology

There has been no major exploitation of metals in eastern Victoria. Small to moderate quantities of gold, silver, lead, molybdenum, iron and manganese have been mined, though presently known resources are insufficient for economic output, even with improved transport and access to the most remote prospects. There is greater potential in the industrial minerals, particularly the limestones, dolomites, building marbles and perhaps barite.

Gold has been mined from reefs and alluvial deposits scattered primarily across outcrops of Ordovician rocks eastwards from Buchan. Promising but small alluvial deposits are known from the Timbarra River, but no mines have been developed in that area. Generally small, but often surprisingly rich, mines have been worked in the Tara Goldfield S. of Buchan; all of these were located in Ordovician rocks except for the Monarch and the Tara Crown (or Armistice) mines—these were in Snowy River Volcanics (Teichert & Talent 1958). Perhaps the area most intensively prospected for gold is the Bendoc-Clarkeville-Bonang-Delegate River area. In the Bendoc-Clarkeville district a number of quartz reefs were worked to depths of 300 ft. The deepest shaft in the area is on the Rising Sun Reef at Bonang; it was sunk to 500 ft and the reef stoped out to the surface (Dunn 1909). Alluvial gold from these reefs and quartz stringers has been worked in alluvial flats along the Bonang, Delegate, Little and Bendoc rivers. A number of quartz reefs have been worked about Club Terrace, e.g. on Millionaire Gully (Kenny 1937a); the reefs repeat for three miles but, though surface prospects were often excellent, the quality did not persist in depth (Murray 1898; Stirling 1898). Farther E. there are minor gold occurrences, at Mallacoota for example, but these have no significance compared with the Yambulla Goldfield just N. of the border.

High *platinum-osmiridium* values have been obtained at the Bounder Mine, Errinundra (Kenny 1937).

Silver-lead mines and prospects are principally located about Buchan in the basal dolomites of the Buchan Caves Limestone (Teichert & Talent 1958), and at Deddick in granodiorite (Ferguson 1899). Ore with a high silver content has been mined at the Glen Shiel Silver Mine, Gelantipy East (Dunn 1907; Whitelaw 1921). There are a number of small lead shows scattered about the Buchan district from Ferntree Creek to Canni Creek and New Guinea Point on the Snowy R. A small quantity of silver-lead ore has been won from the silver mine at Boulder Flat S. of Errinundra. A few small lead-zinc bodies with ferruginous gossans occur in the Limestone Ck district and, though one of these assayed up to 36·6% zinc, none has proved economic (Mahoney 1936).

Small bodies of *molybdenum* ore occur at Wangrabelle where shafts have been sunk to a depth of 70 ft (Herman 1920); molybdenite has also been mined just N. of the border at Wog Mountain (Hall 1959).

Small quantities of *barite* have been mined at the Glen Shiel Mine, Gelantipy East, and on the Old Basin Road, East Buchan. It is known from a number of

localities southwards from South Buchan, and at the Errinundra silver mine, Boulder Flat, Errinundra.

Graphite occurs in small quantities on Sundown Ck about 3 miles NW. of the Princes Highway at Bell Bird Creek (Herman 1920).

There has been no quarrying for *feldspar* in the area, though largish masses of soda-feldspar adjoining a gneiss-granite contact at Mt. Raymond E. of Orbost have attracted interest. Pegmatite dykes within the area are worthy of investigation, because about 4,000 tons of albite feldspar have been produced from a pegmatite dyke at Wog Mountain N. of the border (Hall 1959).

Small quantities of *tungsten* have been won at Mt. Bendoc, and at Fainting Range SSE. of Ensay (Thomas & Crohn 1952).

Monazite is a prominent component of alluvial deposits at Pinch Swamp Creek 5 miles N. of Bonang, though not in commercial quantities (Copland 1905).

Small *copper* lodes have been worked at Accommodation Creek, Deddick, and at Sardine and Wallaby Creeks on either side of the Bonang Highway (Dunn 1909a). Other small copper lodes are known about Limestone Ck, Ferntree Ck, the lower Timbarra R., The Basin near Buchan, and on the Snowy R. about 16 miles from Orbost; also at the Dominion Copper Mine on the head of Hospital Ck.

The *iron* ores of the Buchan-Nowa Nowa district have been extensively tested by drilling in recent years (Bell 1959), but tonnages have fallen far short of those necessary as a basis for a steel industry. One of three limonite bodies within the Buchan Caves Limestone SE. from Buchan has been quarried for 'scrubbing gas'; it is not being worked at present. (Teichert & Talent 1958). Northwards from South Buchan towards Jackson's Crossing the iron ores pass into essentially *manganese* ores, of which there are three main outcrops between The Basin and Jackson's Crossing (Kenny 1921, 1925; Thompson 1965).

The greatest potential mineral wealth of east Gippsland is in its *carbonate rocks*: the limestones and dolomites of the various bodies of Buchan Group sediments, the marbles of the Cowombat Group, and the soft limestones of the Gippsland Limestone. Green, red-brown, buff, magenta, white and flesh-coloured marbles are developed as lenticular bodies principally at Old Hut Creek, Bindi, and along Limestone and Stony Cks about 25 miles E. of Benambra. Outcrops of individual marble lenses are up to acres in extent and outcrop strongly; small quarries were opened up many years ago in the Limestone Ck-Stony Ck area (Whitelaw 1954), but these proved uneconomic due to method of working and, more particularly, prohibitive costs of transport. A small quarry was opened in the Silurian marbles between Sardine Creek and Martin's Creek about the turn of the century, but the most impressive deposit, the one at Bindi, remains untouched. *Dolomites* outcrop extensively at the base of the Buchan Caves Limestone, ranging in thickness from a few tens of feet at Bindi, Butcher's Ridge and Dead Horse Creek to a maximum thickness of around 200 ft at East Buchan where they have been quarried in small amounts for flux in steel making. Their low to moderate R_2O_3 content (sometimes as low as 0·25% Fe_2O_3) makes them potentially useful, for example, in the glass industry. The dolomite resources of the Buchan and adjacent districts is of the order of 100 million to 150 million tons. Devonian *limestones* were formerly quarried for building marble at three localities about Buchan: Commonwealth, Heath's and Cameron's quarries. Limestone of the Murrindal Limestone is presently quarried at Rocky Camp, 5 miles N. of Buchan for use in the paper industry at Maryvale. Because of ease of extraction, the Tertiary limestones exposed in valleys westwards from Orbost are an excellent source of agricultural limestone and perhaps for a future cement industry; they are presently worked on a small

scale for agricultural limestone just N. of the Princes Highway on the Toorloo Arm of Lake Tyers.

Several small deposits of heavy minerals with patchy distribution of *ilmenite*, *zircon* and *rutile* are recorded from the vicinity of Cape Everard (N. H. Fisher, unpub.; G. Bell, unpub.); a possible 2000 tons of concentrate is thought to be present in the two largest deposits, the most promising being immediately E. of Point Hicks. Records from farther E., e.g. Betka R., have so far proved insignificant.

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4

Botanical Exploration of East Gippsland

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Abstract

The paper summarizes the botanical exploration which added to the known flora of Victoria the species of vascular plants, approximately 200 in number, which in this state are restricted in distribution to East Gippsland. Details are given of the original authentic Victorian record of most of these species. The principal articles and papers which have dealt with East Gippsland vegetation are noted.

Introduction

Approximately 1,400 species of vascular plants are native in East Gippsland, and about 14 per cent of these do not occur elsewhere in Victoria. Amongst the species which in Victoria are confined to East Gippsland are these groups:

1. Over 30 species belonging to near-coastal heathlands and sedge-flats. Most of these species do not occur W. of the mouth of the Snowy R., but there are a few in the Providence Ponds area to the W. of the Gippsland Lakes.

2. About 40 species belonging essentially to the warm-temperate rain-forests. This formation occurs along streams at low elevations, mainly from the lower Snowy R. eastward but with outliers as far W. as the Mitchell R. gorges NW. of Bairnsdale.

3. About 30 species on rock outcrops, mainly of the Cann River-Genoa area.

4. About ten species in dry rain-shadow areas of the upper (Victorian) Snowy R. valley.

5. About ten sub-alpine species.

6. A number of species, some widespread and some localized, in lowland dry sclerophyll forest areas.

This paper summarizes the botanical exploration which added these East Gippsland plants to the known flora of Victoria. A few typically East Gippsland species, which extend to South Gippsland, are included in the summary. Almost all the records of plants, noted in this paper, have been verified by study of the specimens concerned in the collections of the National Herbarium of Victoria. In particular, this source of reference has provided the basis for statements that certain species were collected but not recorded in the references cited.

During his term as Government Botanist of Victoria, Baron Sir Ferdinand von Mueller included in his published lists of native Victorian plants many species which had not, in fact, been discovered in this State. In some cases this was the result of errors in identification, but it was due mainly to the policy of recording as Victorian any species which had been collected near the boundaries of the State. Many of the species concerned have since been found in Victoria. Premature and erroneous records which concern the East Gippsland flora have been studied elsewhere (Wakefield, 1952). In the present paper, species which had been recorded prematurely, before their actual first discovery in Victoria, are marked with an asterisk.

Ferdinand Mueller, 1853-1861

Mueller made a number of journeys in Victoria, on four of which he came in contact with East Gippsland vegetation. Results of the first three journeys are embodied in general reports to the Victorian Government, to which are appended the first, second and third systematic lists of Victorian plants (Mueller, 1853, 1854, 1855). The other report concerning East Gippsland was accompanied by the sixth systematic list (Mueller, 1861). In the following summary, unless it is indicated otherwise, all observations and species mentioned in connection with Mueller's first, second and third journeys and that of 1860, appeared in the corresponding reports and lists. The generic and specific names in parenthesis are names used by Mueller in his various publications, and they may indicate synonyms (including *nomina nuda*) or errors in identification.

In Mueller's first general report, in September 1853, he mentioned journeying 'along the LaTrobe River', and 'several weeks travelling in the neighbourhood of Port Albert, and many excursions through Wilson's Promontory'. He collected *Gompholobium latifolium* from the Latrobe and *Banksia serrata* from the coast. He also collected *Eugenia smithii* (*Acmaena floribunda*), *Pittosporum undulatum*, *Elaeocarpus reticulatus* (*cyaneus*) and *Leptorhynchos linearis* (*nitidulus*), which four appeared in the second systematic list.

In February 1854, Mueller ascended the Cobberas Mountains and collected a number of previously unknown species and varieties of vascular plants. As a result, the Cobberas became the type locality of the following:

Hierochloe submutica F. Muell.
Agrostis muelleriana J. Vickery (*A. gelida* F. Muell.)
Scleranthus singuliflorus F. Muell. (*Mniarum*)
Phebalium phylicifolium F. Muell. (*Eriostemon phylicoides*)
Asterolasia trymalioides F. Muell. (*Eriostemon*)
Pimelea alpina F. Muell.
Pimelea curviflora var. *alpina* F. Muell. (= *P. biflora* N. A. Wakefield)
Oschatzia cuneifolia (F. Muell.) Druce (*Centella, Azorella*)
Seseli harveyanum F. Muell.
Aciphylla simplicifolia F. Muell. (*Anisotome*)
Pratia puberula F. Muell.
Leucopogon macraei F. Muell.
Olearia alpicola F. Muell. (*Eurybia*)
Olearia megaphylla F. Muell. (*Eurybia*)
Brachycome nivalis F. Muell.
Helichrysum secundiflorum N. A. Wakefield (*Ozothamnus planifolius*)
Ewartia nubigena (F. Muell.) Beauv. (*Antennaria*)
Gnaphalium umbricola J. H. Willis (*G. alpigenum* F. Muell.)

After his visit to the Cobberas, and a north-easterly excursion to the New South Wales tract of the Snowy River, Mueller returned to Omeo and from there proceeded down the Tambo River valley and then easterly to the Orbost district, which he noted as 'the most southerly locality in which palms exist in the Australian continent'. He described the flora of the lower Snowy River in these terms:

> The vegetation here assumes entirely a tropical character, with all its shady groves of trees producing dark horizontal foliage, with all those impenetrable thickets and intricate masses of parasites and climbers over running the highest trees, and with so many typical forms never or but rarely transgressing the torrid zone. The ocurrence of so many plants of a really tropical type, bears a sufficient testimony not only to the geniality of the climate but also to

the capability of the soil in the district. Transitions to the flora of New South Wales were here perceptible everywhere.

On this occasion, about the lower Snowy and Brodribb River, Mueller collected the following:

Sarcopetalum (*Cocculus*) *harveyanum*, *Cissus hypoglauca* (*australasica*), *Celastrus australis*, *Pultenaea retusa*, *Kennedia rubicunda*, *Rubus rosaefolius* (*eglantiera*), *Eucalyptus botryoides*, *Persoonia linearis*, *Morinda jasminoides*, *Bidens tripartita*, *Tylophora barbata*, *Marsdenia rostrata*, *Plectranthus parviflorus*, *Smilax australis* (*spinescens*), *Eustrephus latifolius* (*brownii*), *Livistona australis*, *Adiantum formosum* and *Pyrrosia rupestris* (*Polypodium serpens*).

Other East Gippsland species obtained during Mueller's second journey were *Callistemon citrinus* (*lanceolatus*) from Tambo River, *Scaevola ramosissima* (*hispidula*) near Sale, *Agropyron* (*Vulpia*) *pectinatum* at Boggy Creek, and *Tristania laurina* 'along rivers'. *Pteris umbrosa* and *Caustis flexuosa* appeared in the second systematic list, but the specimens concerned are not available to provide locality data; *Acacia kybeanensis* was collected near the Cobberas, and *Pomaderris discolor* and *Pteris vittata* (*longifolia*) near Bruthen and at Buchan respectively, but were not recorded in the list.

Mueller's third journey, in early 1855, was concerned mainly with the Kosciusko region of New South Wales. Afterwards, he travelled south through Wulgulmerang and Buchan, but did very little collecting on the way. He then visited the 'Palm Tree Country' again and, amongst specimens collected in the Orbost district were *Baeckea virgata* (*Camphoromyrtis pluriflora*), *Lysimachia salicifolia* (*vulgaris*), *Notelaea longifolia* (*venosa*) and *Libertia* (*Sisyrinchium*) *paniculata*. *Ripogonum album*, collected there on the second or third journey, appeared in the fourth systematic list of 1858. Returning westward along the coast, Mueller collected *Acronychia laevis* (*laurina*), *Bossiaea heterophylla*, *Muellerina* (*Phrygilanthus*) *celastroides*, *Olearia* (*Eurybia*, *Aster*) *viscosa* and *Geitonoplesium cymosum*, in the vicinity of the Gippsland Lakes.

In September 1860, Mueller went by sea to Twofold Bay, from which he travelled overland to Genoa, thence to Mallacoota and Cape Howe. He then ascended the Genoa River valley to Nungatta, and from there returned to Twofold Bay. The Genoa-Mallacoota track passed over the shoulder of Genoa Peak, in which area Mueller collected *Pomaderris lanigera* (*P. ferruginea* var. *pubescens*) and *Leptomeria acida* (neither of which is in the sixth systematic list), and *Patersonia glabrata*. The 'Entrance of the Genoa River' (= Mallacoota) yielded *Spyridium cinereum* (*Cryptandra obcordata*) (not in the sixth list), *Melaleuca armillaris*, *Angophora floribunda* (*intermedia*) and *Persoonia levis* (*salicina*, *lanceolata*). From 'abreast of Gabo Island' came specimens of *Conospermum taxifolium* and *Helichrysum elatum* (*albicans*).

From the banks of Genoa River, Mueller collected *Hibbertia dentata*, *Phebalium squamulosum* (*Eriostemon lepidotus*), *Commersonia fraseri*, *Dodonaea triquetra*, *Dendrobium speciosum*, *Dendrobium striolatum* (*milligani*), *Leptospermum emarginatum*, *Lepidosperma urophorum* and *Callistemon subulatus* (the last three of which are not in the sixth list). These nine species, and many others which Mueller collected and labelled 'Genoa River', grow together about the mouth of the granitic gorge about two miles upstream from the present township of Genoa, at the point where the old Wangarabell track swung westerly away from the river.

On Nungatta Mountain, Mueller discovered *Telopea oreades* (the Gippsland Waratah) and *Elaeocarpus holopetalus*, both of which he subsequently named.

The Period 1864-1923

In 1864-65, Norman Taylor carried out a geological reconnaissance of East Gippsland, working for some time in the Genoa area and visiting Cann River. He collected botanical specimens for Mueller but lost many of them in a flood at Genoa, and others were left at Cann River and never retrieved (Taylor, 1866). The few specimens which reached the National Herbarium include **Elaeocarpus holopetalus* from 'Drummers Creek track to Mt. Cann', and *Caustis flexuosa* from 'Canns River'.

In 1869-71, Charles Walter, who was employed by Mueller as a collector, accompanied the geodetic survey party which established beacons on prominent peaks in East Gippsland. In the Howe Ranges he found *Eucryphia moorei* and *Schelhammera undulata* (which appear in Mueller's seventh systematic list of 1874), and he discovered *Prostanthera walteri* on Mount Ellery, which species Mueller named in his honour. Besides these, Walter authenticated some of Mueller's premature records by collecting **Adiantum hispidulum* in the Howe Ranges, and **Oxylobium ilicifolium* (*trilobatum*) and **Glossodia minor* near Genoa. A specimen labelled by Mueller **Goodenia barbata* ('Genoa and Howe Ranges') without other data, was probably from Walter.

Mainly from 1879 to 1884, A. W. Howitt gathered botanical data, often through police officers working in East Gippsland. He provided specimens of *Hibbertia pedunculata* and **Acacia boormanii* (*linearis*) from the Snowy River near Deddick, and **Hierochloe rariflora* from Bonang.

At this stage a key and census of Victorian plants was published (Mueller, 1886, 1888), containing species recorded to date as well as many species prematurely or erroneously recorded for the state. However, much of Howitt's material Mueller did not study, but stored with other specimens he could not cope with. So it accumulated, and some discoveries made by Howitt and his associates were not brought to light until very recently. These included specimens of *Helichrysum adnatum* and *Pultenaea subspicata* from the Wulgulmerang-Deddick area. Howitt also provided specimens of *Pomaderris pauciflora* from Tubbut.

Later, Howitt made a study of the eucalypts of Gippsland (Howitt, 1891), amongst which he recorded *E. bosistoana* from Nicholson River and *E. maidenii* from Metung.

In the 1880s, a network of mining tracks was cut throughout East Gippsland, so that access was about equal to that provided today by Forests Commission access roads. About 1887-89, Edwin Merrall made use of such tracks to investigate the Delegate and Bemm River areas (Merrall, 1888). Amongst his botanical material were the first truly Victorian specimens of **Acacia subporosa* ('near Mount Ellery'), **Telopea oreades* ('head of Delegate River') and **Gahnia melanocarpa* ('most eastern Gippsland').

In the summer of 1888-89, Baldwin Spencer led an excursion into the area between Orbost and Bendoc and the natural history was described (Spencer and French, 1889). The large 'gebung' in the 'subtropical jungle' near Goonmirk Range was the recently described *Persoonia silvatica.*

While stationed in East Gippsland, between 1911 and 1918, Rev. A. J. Maher collected **Baeckea linifolia* and *Dendrophthoe vitellina* at Mallacoota. **Goodenia stelligera* at Genoa, and *Solanum violaceum* at Mount Drummer.

T. S. Hart, Principal, Bairnsdale School of Mines, wrote an account of the vegetation of the Bairnsdale-Gippsland Lakes area, in which were authentic Victorian records of *Thryptomene micrantha*, **Isopogon anemonifolius* and **Beyeria lasiocarpa.* (Hart 1923).

The Period 1935-1950

While on the staff of the Orbost High School, from 1935 to 1937, F. Robbins collected extensively in East Gippsland. He discovered *Cyathea leichhardtiana* and **Lastreopsis microsora* (*Aspidium tenerum*) at Mount Drummer; *Cryptostylis erecta*, *Galium binifolium* and **Leucopogon esquamatus* at Marlo; **Pomaderris ligustrina*, *P. costata* and *Korthalsella japonica* near Orbost; *Brachycome petrophila* and *Dillwynia prostrata* at Wulgulmerang; and *Galium liratum* at Nowa Nowa.

W. Hunter, a surveyor of Bairnsdale, studied the East Gippsland flora, mainly in the 1930s and 1940s. He contributed Victorian specimens of *Thysanotus junceus* and *Persoonia lucida* from near Genoa, *Chloris ventricosa* and **Glossogyne tenuifolia* from Suggan Buggan, *Helichrysum argophyllum* and *Acacia silvestris* from Nowa Nowa, *Pomaderris pallida* and **Sorghum leiocladum* (*plumosum*) from Ingeegoodbee, **Myoporum* (*Disoon*) *floribundum* from Deddick, **Leucopogon pilibundus* (*microphyllus*) from Bonang, and *Acacia maidenii* from Newmerella. At Marlo he discovered *Cryptostylis hunterana*, which was named in his honour. Hunter (1941) published an account of the flora of Suggan Buggan, part of the rain-shadow area of the upper (Victorian) Snowy River valley.

Between 1938 and 1950, N. A. Wakefield substantiated premature records of Mueller's and added other East Gippsland species to the known flora of Victoria by collecting the following:

**Ficus coronata* (*aspera*), **Eucalyptus pilularis* and *Olearia dentata* from the Howe Ranges; **Cyathochaeta diandra* from Mallacoota; **Sticherus* (*Gleichenia*) *flabellatus*, *Asplenium falcatum*, *Lastreopsis decomposita*, *Seirpus forsythii*, *Prasophyllum appendiculatum* and *Pterostylis baptistii* from the Genoa area; *Lycopodium carolinianum*, *Danthonia paradoxa*, *Panicum fulgidum*, *Lepidosperma limicola*, *Lepyrodia anarthria*, *Xyris juncea* and *Thelymitra cyanea* from Maramingo Ck; *Patersonia longifolia*, **Casuarina nana*, **Persoonia myrtilloides*, **Pultenaea altissima* (*flexilis*), *Pomaderris sericea*, *Pomaderris cotoneaster* and *Hibbertia diffusa* from the upper Genoa R.; *Stylidium laricifolium* from Wingan Inlet; **Hakea dactyloides*, **Daviesia wyattiana*, *Gompholobium glabratum*, *Pomaderris andromedifolia* and **Pomaderris ledifolia* from Mount Kaye; *Athyrium japonicum* and *Deyeuxia microseta* from Combienbar; **Deyeuxia gunniana* (*breviglumis*) and *Thelymitra retecta* from the upper Delegate R.; *Pterostylis reflexa* from Mount Raymond; *Leucopogon riparia*, *Hibbertia spathulata*, *Brachycome riparia* and *Asperula ambleia* from the lower Snowy R.; *Poa saxicola* from the Cobberas Mountains; *Polystichum formosum* from Deadcock Ck; and *Eragrostis trachycarpa* and *Cyperus polystachyos* from Providence Ponds.

Examples of warm-temperate rainforests were described and summaries given of the fern-flora and of the orchids of East Gippsland (Wakefield, 1944a, 1944b, 1950a, 1953). Series of taxonomic papers were published in the *Victorian Naturalist*, from 1939 to 1944 on pteridophytes and from 1951 to 1957 on flowering plants, and the type specimens of 30 of the new species described, including 10 in the genus *Pomaderris*, were from East Gippsland collections.

Miscellaneous Records

Other contributions relevant to this summary are as follow:

W. Sayer. *Xanthorrhoea resinosa*, 'Beyond Orbost', 1887.

W. Bauerlen. *Acacia obtusifolia*, Mount Drummer, 1887.

H. Foster. *Clematis glycinoides*, lower Snowy R., 1889.

J. St. E. D'Alton. **Marsdenia flavescens*, Lakes Entrance, 1890.
J. Cameron. *Olax stricta*, lower Cann R., 1895; **Alectryon subcinereus* (*Cupania xylocarpa*), Genoa, 1915.
R. P. Cameron. **Eupomatia laurina* and *Plectorrhiza tridentata*, Orbost, 1895; *Sarcochilus falcatus*, Cann River, 1895.
C. H. Grove. **Rubus hillii* (*moluccanus*) and *Pultenaea amoena*, Newmerella, *ca* 1895.
E. E. Pescott. *Pteris umbrosa*, Orbost, and **Leptospermum attenuatum*, Cape Conran, *ca* 1900.
A. D. Hardy. *Eucalyptus fastigata*, 'Gippsland', 1912.
H. B. Williamson. **Schoenus imberbis*, Spermwhale Head, date ?
A. H. Archibald, **Pittosporum revolutum*, Gipsy Point, 1928.
V. & B. Miller.**Scutellaria mollis*, *Prasophyllum rogersii* and **Trema aspera*, Mallacoota, 1930.
A. Birch. **Desmodium brachypodum* and **Pultenaea viscosa*, near Wentworth R., *ca* 1930.
E. K. Turner. **Notothixos subaureus*, Mallacoota, 1935.
J. H. Willis. *Logania pusilla*, Mallacoota, and *Hibbertia rufa*, near Cann River, 1948.
L. Hodge. *Westringia cremnophila* and *Boronia ledifolia*, Snowy R. gorges, *ca* 1950.
E. V. Barton, *Prasophyllum viride*, Mallacoota, 1960.
K. C. Rogers. *Acacia lucasii* and *Monotoca rotundifolia*, Nunniong Plateau, 1964.

Addendum

Carr (1962) provided evidence that Mueller's route to the Mount Hotham area in 1854 was most likely by way of the headwaters of the Dargo River, not by way of Cobungra as suggested by Wakefield (1950). In discussing this matter, Carr made these statements:

> Wakefield (1949) following a suggestion made by Barnard (1904) showed that . . . Mt. Latrobe can be identified at Mt. Loch and Mt. Hotham as Mt. Feathertop.
> Wakefield, relying on an old, very inaccurate sketch plan . . . dated 1864, and perhaps misled by the mention of the Mitta Mitta (actually the West Kiewa R.) assumed that Mueller crossed the Divide near the site of the present Cobungra settlement.

These statements are not in accordance with the references cited, and the 1949 is an error for 1950.

Barnard (loc. cit.) concluded that Mueller 'instead of ascending Feathertop and naming it Hotham, really ascended our Bogong and bestowed that name (Hotham) upon it, while his Latrobe is either Mt. Wills . . . or Mt. Nelson'. Wakefield (1950) stated that 'these contentions cannot be supported' and reached the conclusion that Mt. Feathertop is Mueller's 'Hotham' and Mt. Loch is Mueller's 'Latrobe'.

Wakefield (loc. cit.) published an accurate map compiled from modern topographical plans, with a small sketch inset at a corner, and the text indicated the source of the sketch and that it was presented to illustrate the application, in 1864, of certain place names. Wakefield stated that the stream which Mueller referred to as the upper Mitta was 'certainly the west branch of the Kiewa River'.

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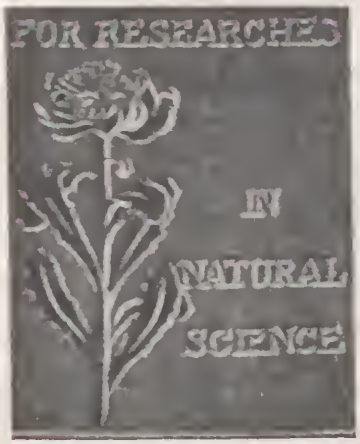

The Mueller Memorial Medal

The Mueller Memorial Medal draws together the three names pre-eminent in early seientific exploration of East Gippsland, Mueller, Spencer and Howitt.

After Baron von Mueller's death, 1896, a committee from the Australian scientifie soeieties, including the Royal Soeicty of Vietoria, chose this form of memorial for the famous botanist, using money subseribed by his friends and admirers.

The beautiful bronze medal is awarded by the Australian and New Zealand Association for the Advaneement of Science 'not more frequently than every seeond year, to the author of the most important contribution, or series of eontributions, to natural knowledge, published originally within His Majesty's Dominions . . . preferenee being given to work referring to Australia.'

The design for the medal was exeeuted by Sir Baldwin Speneer. It shows von Mueller with an aeaeia spray in his hand, and on the obverse, a waratah. (Speneer's early sketch of the East Gippsland waratah, 1889, is shown on page 76 of this Volume.)

The first award of the medal, 1904, was made to A. W. Howitt 'for his distinguished serviees as an ethnologist and geologist, and for his exploration in Australia.'

5

Botany of East Gippsland

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With Appendix By J. H. Willis

National Herbarium of Victoria

Abstract

The distribution of the rich vascular flora of East Gippsland is discussed, special attention being given to the plants characteristic of the warm coasts of New South Wales and Queensland, the dry areas inland from the Great Divide and the cool sub-alpine regions of Australia. An account is given of the most important of the wide range of plant communities found in this part of Gippsland. This includes rainforest, sclerophyll forest, woodlands, scrubs, thickets and heaths, and the variation of these communities with altitude is described. The effects of fire are considered wherever possible.

The fascination of East Gippsland to the botanist lies in the fact that it is the meeting ground of different floras from the north, west and south.

Since the habitat, east of the line joining the Mitchell and Murray headwaters, ranges from sub-alpine mountains and montane valleys to humid coastal flats, it is not surprising that the flora is a rich one. Of the vascular plants, 1200 (roughly half the state's total) occur within the region which is defined by the Symposium as E. of the Tambo-Mitchell Rivers and which makes up only 7 per cent of the area of the state. Two hundred species and 37 genera do not extend further W. than the Tambo and Mitchell rivers. The *Dendrobium* orchids are a notable example of this restriction. About 36 eucalypts, or half of the state's complement, grow in East Gippsland, although only eight are limited in Victoria to this sector. The same general picture applies to the genus *Acacia*.

Ferns are richly developed in East Gippsland; 80 out of the 92 species occur here, although only 10 per cent are restricted to this area. Mosses are also numerous (at least 150 species); many extend from New South Wales and from other regions of Victoria.

Distribution of Taxa

The plant geography of East Gippsland shows many interesting patterns of distribution. Concentric distributions radiate from the Cape Howe region, from the dry valleys of the north and from the west. A great many species distributions overlap in this south-east corner of the continent. There is a well defined element of the vegetation comprising species that are more numerous further north along the coasts of New South Wales and Queensland (Patton 1930). This so-called 'warm element' extends westwards to a varying degree; this can be seen from the following list which shows the western limits of relevant species:

(i) Howe Range
Eucryphia moorei, Trema aspera

(ii) Mallacoota Inlet and Genoa Gorge
Ficus coronata, Santalum obtusifolium, Alectryon subcinereus, Galium binifolium, Logania pusilla

(iii) Wingan Inlet area
Angophora floribunda, Eucalyptus gummifera, Stylidium laricifolium
(iv) Bairnsdale and Mitchell River gorge
Eucalyptus botryoides, Tristania laurina, Marsdenia rostrata
(v) The Macalister River Valley
Eucalyptus andreana, E. bosistoana
(vi) Wilsons Promontory
Eugenia smithii, Elaeocarpus reticulatus, Banksia serrata, Kunzea ambigua, Eucalyptus muelleriana, Melaleuca armillaris
(vii) Western Port
Pittosporum undulatum
(viii) Healesville-Warburton-Dandenong Range area
Fieldia australis, Pyrrhosia rupestris, Eucalyptus globoidea, E. nitens.
(ix) Coimadai area and Brisbane Ranges
Eucalyptus sieberi, Grevillea chrysophaea.

Species which are normally found in relatively low rainfall areas on the plains and foothills on the inland side of the Great Divide are also found in the rain shadow area of the middle tract of the Snowy River System. This 'dry element' of the vegetation extends a variable distance southwards from the region of the geodetic border. Illustrations of such distributions are:

(i) The Suggan Buggan and upper Snowy River valleys
Callitris columellaris, C. endlicheri, Eucalyptus albens, Acacia boormanii, Boronia ledifolia, Cymbopogon refractus
(ii) The Mitchell River gorge
Brachychiton populneus

Many species, such as *Eucalyptus sideroxylon, E. polyanthemos* and *Acacia mitchellii* (Providence Ponds), extend from western and central Victoria into East Gippsland. *Micromyrtus ciliatus, Kunzea parvifolia* and *Phebalium glandulosum* are heathy species which reach the Snowy gorge area from their usual habitats of the Grampians-Little Desert or the Big Desert. The Snowy River is the site of the only endemic species for the region which, according to Wakefield (1957), are *Leucopogon riparius, Westringia cremnophylla* and *Hibbertia spathulata.*

The cool element in the vegetation is represented by higher altitude species from the sub-alpine terrain to the NW., from wet central district mountains and from Tasmania. Species such as *Atherosperma moschatum, Podocarpus lawrencei, Drimys lanceolata, Leucopogon macraei* and *Libertia paniculata* occur in higher altitude areas in the mountains of this region. The absence of *Nothofagus* and the almost complete lack of *Eucalyptus regnans* (there are pockets on the Nuniong Plateau) are very notable features. The waratah *Telopea oreades* is a link with the floristics of New South Wales and Tasmania, where the related species occur. East Gippsland provides enigmatic distributions such as those of the Japanese fern, *Athyrium japonicum*, and the mistletoe *Korthalsella japonica.* It is also a centre of diversity of the shrub genus *Pomaderris*, which has 17 species in this area.

The botanical drawings accompanying this paper, and other botanical drawings in the volume, were made by Sir Baldwin Spencer, and are published by courtesy of the Field Naturalists' Association of Victoria. They illustrate his well-known paper (with C. French, F.L.S.), 'Trip to Croajingolong'. (Vict. Nat. 1889), descriptive of the exploratory journey made with four companions to East Gippsland, 1888, the year after Spencer arrived in Australia as Professor of Biology at the University of Melbourne.

A group of full-grown palms growing by the side of Cabbage Tree Creek.
(*W. B. Spencer, 1889.*)

Plant Communities

Apart from the species present, a very distinctive feature of East Gippsland vegetation is the great range and variety of its plant communities. In the brief account of these which is given below, the classification of formations follows Wood and Williams (1960) and the zones and ecology of forest types are based on those of Ingoll (1940).

1. Rainforest

(a) Lowland (less than 1500 ft)

For a Victorian, the most conspicuous feature is the complexity of the coastal gully vegetation. The so-called 'jungles' have dense trees and tumbling masses of ropey lianes. To a Queenslander, this is a depauperate and simplified version of the familiar subtropical rainforest of the north. The East Gippsland rainforest could be termed warm temperate or, according to Webb's classification (1959), a microphyll fern forest. A handful of tree species make up the tree canopy, which is more or less continuous and dense.

Eugenia smithii, which reaches 60 to 90 ft in height, is the most characteristic tree. It is associated with *Tristania laurina* along creeks and river banks and with other less important trees such as *Rapanea howittiana*, *Acronychia laevis* and *Elaeocarpus holopetalus*. Many trees show abundant regeneration. On the Brodribb and Cabbage Tree Cks. near Marlo, patches of rainforest contain the palm *Livistona australis*, which is separated from the main areas in New South Wales by some 200 miles. These palms reach heights of 72 ft and are regenerating; they appear to be fire resistant to some extent. The blackwood, *Acacia melanoxylon*, often co-dominates with *Eugenia* in rainforests. The lianes form a suite of 17 species, 4 of which are wiry. Most occur only to the east of the Mitchell Gorge, but 4 species (including *Parsonsia brownii* and *Pandorea pandorana*) extend west to gullies near Melbourne, although they are not particularly prolific there. All species extend to New South Wales and most to Queensland. *Marsdenia rostrata*, *Smilax australis*, *Cissus hypoglauca*, *Eustrephus latifolius* and *Clematis glycinoides* are quite common; other genera include *Rhipogonum*, *Sarcoperalum* and *Tylophora*.

Ferns are usually prolific, and up to five species of tree fern may be found in a single stand, e.g. Mt. Drummer (Wakefield 1944). Ferny epiphytes are often common, and mosses locally abundant.

This warm temperate rainforest occurs on rich alluvial loams and on friable soils on southern seaward slopes of coastal hills such as Mt. Cann and Mt. Drummer.

Many areas have been severely damaged by fire; some smaller pockets have been obliterated (N. Wakefield—pers. comm.). Dense shrubs and small trees such as *Pomaderris* and *Acacia* spp. usually follow in the wake of fires. At Lake Curlip there is evidence of primary succession from submerged fresh water vegetation to reed beds (*Phragmites*), ti-tree (*Melaleuca*) thicket and *Eugenia* rainforest. Even so, the occurrence of an old overstorey of *Eucalyptus botryoides* and soil charcoal in the rainforest indicates prior destruction by fire. Fire has permitted the extension of reed bed *Phragmites* into *Melaleuca ericifolia* areas. Similarly, *Eugenia* may be replaced by *Melaleuca* thicket if regularly burnt.*

* An account of the ecology of this area will be published by Cowling and Ashton at a later date.

(b) Montane (1500-3000 ft)

Above 1500-2000 ft, *Eugenia smithii* is replaced by *Atherosperma moschatum*, and *Pittosporum undulatum* by *P. bicolor*. *Elaeocarpus holopetalus* and *Acacia melanoxylon* remain, and shrubs such as *Drimys* and *Telopea oreades* are abundant. Lianes such as *Parsonsia* and *Smilax* are sparse or absent. *Dicksonia antarctica* becomes the chief tree fern in the community. Mosses are very conspicuous on trunks, logs and rocks. This is then the cool temperate rainforest, akin to that in southern Victoria, Tasmania and high altitude New South Wales.

Nothofagus is conspicuous by its absence. A curious community of dense mossy scrub—*Drimys*, *Telopea*, *Notelaea* and *Prostanthera lasianthos*, with emergent *Podocarpus lawrencei* 30-35 ft high—occurs on Goonmirk Range at 3000 ft. This is an odd form of rainforest thicket probably controlled by cloud incidence and the virtual absence of fire.

2. Sclerophyll Forest

The bulk of the vegetation of the region is sclerophyll forest dominated by species of *Eucalyptus*. More species contribute to stands here than in other parts of Victoria and sometimes five or six species may be encountered in quite a short distance.

(i) *Wet Sclerophyll Forest*

(a) Lowland

In the wettest areas, 40″ per annum and above, and sheltered areas with more than 30″ per annum, wet sclerophyll forests may be found with trees 150-210 ft high and a dense, broad-leaved understorey with abundant ferns. In many cases these flank the rainforest, and clear evidence exists (e.g. at Cabbage Tree Creek) that burning has permitted them to spread at the expense of the rainforest. *Eucalyptus cypellocarpa*, *E. botryoides* and *E. muelleriana*, with understoreys of *Pomaderris* and *Bedfordia*, have regenerated following incineration of *Eugenia* rainforest. *Eugenia* is at present regenerating prolifically into these areas.

In the foothills areas, blue gum (*E. maidenii*), *E. fastigata* and *E. andreana* occur in wet sclerophyll forest; in some cases mature eucalypts occur over mature rainforest, indicating a history of catastrophes.

(b) Montane

In the montane belt at Mt. Ellery, *E. nitens*, *E. fastigata*, *E. obliqua* and *E. delegatensis* form wet sclerophyll forest with dense shrubs of *Telopea*, *Coprosma* and *Drimys*. On the Errunundra Plateau, a fully developed *Atherosperma* forest occurs beneath a mature stand of *E. nitens*, indicating an ecological story similar to the one in the lowlands.

At 4500-5500 ft, where rainfall is high (>40″), *E. delegatensis* occurs, but may form a grassy forest due to the paucity of shrub development.

Soils of the montane forests vary from podzolic to friable red/brown loams with much organic matter. They are often deep, and show good moisture retention.

(ii) *Dry sclerophyll forest*

On leached sands or sandy loams over clays and on drier aspects in moderate rainfall areas (30″ p.a.), a dry sclerophyll forest 70-120 ft high is developed. The undergrowth consists of small-leaved, sclerophyllous leguminous and proteaceous shrubs such as *Acacia*, *Daviesia*, *Platylobium*, *Banksia*, *Hakea* and

Shingle bank suecession through herbs, shrubs, *Leptospermum* and then *Callistemon* to riparian wet sclerophyll or dry sclerophyll forest oecurs on the larger streams. This will probably continue to a stable state along the Snowy R. now that floods are controlled by the Snowy Hydro-eleetric Scheme. Sheltered chasms (e.g. Stradbroke Chasm) in this dry belt provide niches for fern gully species (*Australina*, *Dicksonia* and several other ferns) many miles from main areas.

(c) Sub-Alpine

At high altitudes, e.g. Cobberas to 6000 ft, *E. pauciflora* forms a sub-alpine woodland with snow grass (*Poa australis*) and alpine shrubs such as *Phebalium*, *Prostanthera* and *Hakea microcarpa*.

This vegetation type is just ineluded in the defined region of East Gippsland and appears to be a relatively dry example of the highland vegetation.

4. Scrub and Thicket

On rocky outerops, xerophytic serub develops along the Snowy and Suggan Buggan valleys. *Acacia silvestris*, *Eriostemon trachyphyllus*, *Phebalium* and *Cheilanthes* characterize this vegetation type. *Psilotum* is an interesting but very rare species in this habitat.

Other areas of scrub which are unfavourable to taller vegetation are on coastal dunes, where *Leptospermum laevigatum*, *Correa alba* and *Leucopogon parviflorus* occur in the salt-sprayed zone.

The swamp areas support thickets and scrubs dominated by *Melaleuca ericifolia* and sedges.

5. Heath

(a) Lowland

Areas subject to seasonal waterlogging because of a hard elay pan may permit the growth of woodlands, *E. cephalocarpa* tree heath or merely swamp heath dominated by multititudinous sedges, rope rushes and sclerophyll shrubs such as *Leptospermum* and *Hakea*. Club mosses such as *Selaginella* and species of the carnivorous genera *Drosera* and *Utricularia* are often present.

Species-rich sandy heaths, dry and wind-exposed in coastal areas from Mallacoota to Marlo, are dominated by *Leptospermum myrsinoides—Casuarina pusilla*, with many legumes, *Xanthorrhoea*, sedges, grasses and orehids. Sueh heaths are frequently burned; hence the height of the dominants and the species composition are very variable.

(b) Montane

Wet heaths are found at higher altitudes in swampy conditions; they show transitions to alpine and sub-alpine bog heaths. At 4500 ft *Sphagnum* is eommon, with the herbaceous *Gentianella* and shrubs of *Richea*, *Epacris* and *Callistemon*.

The vegetation pattern in East Gippsland is therefore probably the most complex in the state, due to the diversity of habitat and burning pattern, and the fact that species from several different floristic regions are competing for sites. The geography of species distribution in some cases suggests a westward advanee from the lowlands of the south-east corner of the continent. For example, around Melbourne and the Dandenong Ranges, *Pittosporum undulatum* is showing evidence of rapid spread well beyond its original area. On the other hand, the disjunct distributions of rainforest pockets suggest that some species such as *Eugenia smithii* may have been more widely distributed in the past.

Persoonia. The geebung, *Persoonia linearis*, is a characteristic shrub of many of these forests. Bracken is often common.

The commonest forest is dominated by *E. sieberi* (silver top) and *E. globoidea* (white stringy-bark) and occurs on ridges consisting of granites, Ordovician slates and Tertiary and Pleistocene sediments. There are many variants of this forest, depending on aspect, drainage, clay content of the soil, altitude and geography. In the far eastern sector, *E. gummifera* and *Angophora floribunda* join the above species.

Where humus podzol soils have developed on deep sands, a somewhat lower forest may consist of *E. globoidea*, *E. botryoides* and *E. consideniana* with *Banksia serrata* forming a conspicuous second storey. Where the soil is still well drained but includes greater amounts of clay, *E. muelleriana* and *E. botryoides* may dominate a forest transitional to wet sclerophyll forest. On well drained ridges, *E. sideroxylon* may dominate individual stands, or it may form forest mixtures with *E. cypellocarpa—E. obliqua* associations and thus show a sharp contrast with the situation in central Victoria.

3. Woodlands

(a) Lowland

Where shallow skeletal soils are associated with very poor or excessive drainage, or where exposure to wind near the coast is great, or where rainfall is relatively low (20″), the tree form is reduced and the stand is more open. The resulting woodland formations (40-80 ft high) may be composed of depauperate forest species or of completely different species.

Sclerophyll woodlands of *E. globoidea* and *E. botryoides*, with *Banksia*, sclerophyll shrubs and bracken, occur on poor soils in exposed coastal areas. On skeletal soils on sandstone and rhyolite, *E. macrorrhyncha*, *E. polyanthemos* and *E. goniocalyx* may form woodlands with a shrubby undergrowth of *Brachyloma* and *Cassinia*. On thin but relatively fertile limestone soils at Buchan, *E. viminalis* and *E. melliodora* occur with a grassy herbaceous floor dominated by *Themeda* tussocks and occasional shrubs of *Bursaria spinosa*.

(b) Montane

On fair to rich soils at higher altitudes (2500 ft)—such as the Wulgulmerang tableland—*E. pauciflora* and *E. rubida* occur with *E. stellulata* (on wetter areas) and *E. camphora* (in water-logged sites). A grass sward includes *Themeda*, *Poa* and *Danthonia*. This area is cold, snowy, frosty in winter, and dry; the annual rainfall is 25″.

A spectacular change to drier valleys with a rainfall of less than 20″ per annum occurs in the Snowy, Suggan Buggan and Deddick River valleys, where woodlands dominated by *Callitris* and/or *E. albens* are found. These are isolated from the main areas on inland slopes of the divide in New South Wales.

Most of these stands are below 2,000 ft. Dense stands of *Callitris columellaris*, with little undergrowth or grass, occur on the N. and W. slopes. *Callitris* is mixed with the eucalypt on E. and SW. slopes, and the eucalypt forms pure stands on S. and SE. slopes.

Callitris stands are possibly 50-80 years old and are remnants of mature grassy woodland. Fire-scarred veterans are 66 ft high. *Callitris* regenerates from seed after fire, whereas eucalypts coppice readily. *Callitris* shows slow germination, rapid initial root penetration and slow growth. Signs of invasion of eucalypt stands by *Callitris* can be seen in the post-myxomatosis era.

Until more is known about dispersal, and the fossil record of the climatically turbulent Pleistocene period, little can be done to illuminate the picture. One thing is certain: caution should be used in any causative correlation with the habitat until the time factor is fully taken into account.

Acknowledgments

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A waratah (*Telopea oreades*) growing at the head of a gully on Mount Ellery. (*W. B. Spencer, 1889.*)

Appendix

Census of Vascular Flora Indigenous to East Gippsland

By J. H. Willis

National Herbarium of Victoria

The following enumeration of families, genera and species in the ferns, conifers and monocotyledons conforms to the author's arrangement in *A Handbook to Plants in Victoria* Vol. 1 (1962), while the families of dicotyledons are grouped according to the order of Engler & Prantl's *Die Natürlichen Pflanzenfamilien* (1887-1902). Known localities are appended for those species having a more restricted range, while plants confined to pockets of 'jungle' (southern extensions of subtropical rain forest) are indicated by the prefixing sign (†). The total number of species listed for East Gippsland is 1435, of which about 200 are not to be found elsewhere in this State.

For the purposes of this list, East Gippsland includes all that part of Victoria on the southern side of the Great Dividing Range and eastward from the Mitchell River valley and its tributary, the Wentworth River. If, as for other papers of the Symposium, East Gippsland be limited to the region lying east of the 148th parallel of longitude, then its known indigenous flora still comprises 1390 species.

Ferns and Fern Allies

Ophioglossaceae

Ophioglossum coriaceum A. Cunn.—Sperm Whale Head, Store Ck near Deptford, Suggan Buggan
Botrychium lunaria (L.) Swartz—Reedy R. cliffs, Ram's Horn SW. of Cobberas, Ingeegoodbee R. (subalpine)
B. australe R. Br.—Lower Snowy R., Noorinbee, Genoa

Osmundaceae

Todea barbara (L.) T. Moore

Schizaeaceae (damp, near-coastal heaths)

Schizaea fistulosa Labill.
S. bifida Willd.
S. asperula N. A. Wakefield

Gleicheniaceae

Gleichenia circinnata Swartz
G. microphylla R. Br.
†*Sticherus flabellatus* (R. Br.) H. St. John—near Genoa Peak, W. slopes of Howe Ra.
S. tener (R. Br.) Ching
S. lobatus N. A. Wakefield

Hymenophyllaceae

Hymenophyllum cupressiforme Labill.
H. peltatum (Poir.) Desv.—Mt. Ellery
Mecodium flabellatum (Labill.) Copeland
M. rarum (R. Br.) Copeland
M. australe (Willd.) Copeland
Polyphlebium venosum (R. Br.) Copeland
†*Macroglena caudata* (Brackenridge) Copeland—Mt. Drummer, Howe Ra.

Cyatheaceae

Cyathea cunninghamii Hook. f.—Young's Ck at Orbost, Bungywarr Ck at Combienbar, Mt. Drummer
C. marcescens N. A. Wakefield—Combienbar district, Mt. Drummer
C. australis (R. Br.) Domin
†*C. leichhardtiana* (F. Muell.) Copeland—'Fairy Dell' near Bruthen, Mt. Drummer, lower Wingan R.

Dicksoniaceae

Dicksonia antarctica Labill.

Dennstaedtiaceae

†*Dennstaedtia davallioides* (R. Br.) T. Moore
Culcita dubia (R. Br.) Maxon
Hypolepis rugosula (Labill.) J. Sm.
H. australis N. A. Wakefield—Arte R.
H. punctata (Thunb.) Kuhn
H. muelleri N. A. Wakefield
Pteridium esculentum (Forst. f.) Nakai
Histiopteris incisa (Thunb.) J. Sm.

Lindsayaceae

Lindsaya linearis Swartz
L. microphylla Swartz—Karlo Ck near Mt. Drummer, Upper Cann R. Valley

Adiantaceae

Adiantum aethiopicum L.
†*A. formosum* R. Br.—Pipeclay Ck near Orbost, Cann R. near Noorinbee
A. hispidulum Swartz
†*Pteris umbrosa* R. Br.
P. vittata L.—on limestone of Buchan & Murrindal districts

P. tremula R. Br.
Pellaea falcata (R. Br.) Fée
Cheilanthes tenuifolia (Burm. f.) Swartz
C. distans (R. Br.) Mett.—Buchan, Suggan Buggan, Noorinbee & Mt. Kaye, Genoa

GRAMMITIDACEAE

Grammitis billardieri Willd.—Mt. Ellery, Mt. Kaye, Genoa Peak & Upper Genoa R.
Ctenopteris heterophylla (Labill.) M. D. Tindale—Combienbar, Cann, Wingan & Genoa Rivers, Mt. Drummer

POLYPODIACEAE

†*Pyrrosia rupestris* (R. Br.) Ching
Microsorium diversifolium (Willd.) Copeland
†*M. scandens* (Forst. f.) M. D. Tindale

ASPLENIACEAE

Asplenium obtusatum Forst. f.—Cape Everard, Ram Head & E. head of Wingan Inlet, 5 miles SW. of Mallacoota
A. falcatum Lam.—2 miles SE. of Genoa (perhaps extinct)
A. flabellifolium Cav.
A. trichomanes L.—Bindi, Forlorn Hope Ck, Buchan, Murrindal R., Boundary Ck near Wulgulmerang (mostly on limestone)
A. bulbiferum Forst. f.
A. flaccidum Forst. f.
Pleurosorus rutifolius (R. Br.) Fée

THELYPTERIDACEAE

Cyclosorus parasiticus (L.) Farwell—Buchan (on limestone)

ATHYRIACEAE

Athyrium australe C. Presl
A. japonicum (Thunb.) Copeland—Buchan, Brodribb R. (?extinct), Upper Combienbar R.
Cystopteris filix-fragilis (L) Bernh.—Native Dog Gorge & Forlorn Hope Ck in Upper Buchan R. Watershed, Little R. Falls near Wulgulmerang (all between 2000 & 3000 ft alt.)

ASPIDIACEAE

Rumohra adiantiformis (Forst. f.) Ching
Polystichum proliferum (R. Br.) C. Presl
P. formosum M. D. Tindale—Deadcock Ck near Mitchell R., W Tree Ck near Gelantipy, Murrindal R., Yambulla Ck near Upper Genoa R.
Lastreopsis decomposita (R. Br.) M. D. Tindale—Mallacoota Inlet opposite Gipsy Point
†*L. microsora* (Endl.) M. D. Tindale
L. shepherdii (Kunz ex Mett.) M. D. Tindale

BLECHNACEAE

Blechnum cartilagineum Swartz
B. patersonii (R. Br.) Mett.
B. nudum (Labill.) Mett. ex Luerss.
B. aggregatum (Colenso) M. D. Tindale—Bindi, Mt. Ellery, Combienbar, Arte R.
B. procerum (Forst. f.) Swartz
B. minus (R. Br.) Ettingsh.
B. fluviatile (R. Br.) E. J. Lowe ex Salomon
B. penna-marina (Poir.) Kuhn—subalpine tracts of Nunniong Plateau, Cobberas & Wombargo and Upper Delegate R.
Doodia caudata (Cav.) R. Br.
D. media R. Br.
†*D. aspera* R. Br.

MARSILEACEAE

Marsilea hirsuta R. Br.—Bairnsdale (on mud)

AZOLLACEAE (aquatic)

Azolla pinnata R. Br.
A. filiculoides Lam.—Mille Inlet on Brodribb R.

LYCOPODIACEAE

Phylloglossum drummondii Kunze
Lycopodium varium R. Br.—Mt. Kaye & Genoa Peak (on granite)
L. deuterodensum Herter—Nowa Nowa, Orbost, Genoa, Cape Howe
L. fastigiatum R. Br.—subalpine tracts of Nunniong Plateau and Upper Delegate R.
L. laterale R. Br.
L. carolinianum L.—Maramingo Ck (6 miles NE. of Genoa)

SELAGINELLACEAE

Selaginella uliginosa (Labill.) Spring
S. gracillima (Kunze) Alston—Ewing's Morass near Lake Tyers, Marlo & Coringle

ISOETACEAE

Isoëtes humilior F. Muell. ex A. Br.—Genoa R. Gorge & Little R. Falls near Wulgulmerang

PSILOTACEAE

Psilotum nudum (L.) Griseb.—Ballantyne Hills near Suggan Buggan
Tmesipteris billardieri Endl.
†*T. parva* N. A. Wakefield—Mt. Drummer & Howe Ra.

†*T. ovata* N. A. Wakefield—Mt. Drummer & Howe Ra.

CONIFERS

PODOCARPACEAE

Podocarpus lawrencei Hook. f.—alpine & subalpine at Cobberas, Wombargo Ra. & Goonmirk Ra.

CUPRESSACEAE

Callitris columellaris F. Muell.—Upper Snowy, Deddick & Suggan Buggan R. valleys (rain-shadow belt)
C. rhomboidea R. Br. ex L. C. Rich—Wingan Inlet & Howe Ra.
C. endlicheri (Parl.) F. M. Bailey—Upper Snowy R., Lower Deddick R. & Upper Gattamurrh Ck

MONOCOTYLEDONS

TYPHACEAE

Typha sp. [identity needs to be checked]

SPARGANIACEAE

Sparganium ramosum Huds.—Orbost

POTAMOGETONACEAE (aquatic)

Potamogeton tricarinatus F. Muell. & A. Bennett ex A. Bennett
P. perfoliatus L.—Tambo R.
P. lucens L.—Tambo R.
P. crispus L.—Bendoc, Wulgulmerang
P. ochreatus Raoul—Bairnsdale, Orbost, Cann R., Little R. near Wulgulmerang, Murrindal R.

ZOSTERACEAE (marine)

Zostera muelleri Irmisch ex Aschers.

RUPPIACEAE (aquatic)

Ruppia sp. [identity needs to be checked] —Bairnsdale, Brodribb R., Betka R., Mallacoota Inlet

ZANNICHELLIACEAE (aquatic)

Cymodocea antarctica (Labill.) Endl.—(marine)
Lepilaena bilocularis T. Kirk—Lower Mitchell R.

JUNCAGINACEAE

Triglochin procera R. Br. (aquatic)
T. striata Ruiz & Pav.
T. minutissima F. Muell.—Sperm Whale Head

ALISMATACEAE

Alisma plantago-aquatica L.—Lake King, Bairnsdale, Orbost, Cann R.

Damasonium minus (R. Br.) Buch.—Bairnsdale, Orbost

HYDROCHARITACEAE (aquatic)

Ottelia ovalifolia (R. Br.) L. C. Rich.—Bairnsdale to Lakes Entrance, Orbost district, near Genoa
Vallisneria spiralis L.—Bairnsdale district, Buchan, Orbost, Upper Snowy R. at Willis

GRAMINEAE

Microlaena stipoides (Labill.) R. Br.
Tetrarrhena acuminata R. Br.—Reedy & Maramingo Cks near Prince's Highway
T. distichophylla (Labill.) R. Br.—Marlo, Wingan Inlet, Maramingo Ck
T. juncea R. Br.
Puccinellia stricta (Hook. f.) C. Blom—Marlo, Mallacoota Inlet
Distichlis distichophylla (Labill.) Fassett—Sperm Whale Head, Lakes Entrance, Cape Conran, Coringle
Poa poiformis (Labill.) Druce—Gabo Is., Wingan Inlet, Ram Head, Cape Conran
P. australis, sp. agg.
P. tenera F. Muell. ex Hook. f.
P. saxicola R. Br.—Cobberas (alpine)
Festuca littoralis Labill.—Coringle, Cape Conran, Tamboon Inlet, Ram Head
F. muelleri J. W. Vickery—Cobberas, Mt. Ellery, Mt. Tingaringy (subalpine)
F. eriopoda J. W. Vickery—Maramingo Ck (6 miles NE. of Genoa)
F. asperula J. W. Vickery (montane to subalpine)
F. hookeriana F. Muell. ex Hook. f.—Wulgulmerang & Cobberas (subalpine)
Dryopoa dives (F. Muell.) J. W. Vickery—Suggan Buggan
Glyceria australis C. E. Hubbard—Wulgulmerang, Bendoc, Cann R.
Agropyron scabrum (Labill.) Pal. Beauv.
A. velutinum Nees—Nunniong Platcau
A. pectinatum (Labill.) Pal. Beauv.
Amphibromus neesii Steud.—Cann R.
Trisetum spicatum (L.) Richt.—Nunniong Plateau, near Suggan Buggan, Cobberas
Deschampsia caespitosa (L.) Pal. Beauv.—Delegate R.
Hierochloë redolens (Soland. ex Vahl) Roem. & Schult.—Cobberas, Upper Delegate R.
H. rariflora Hk. f.
Dichelachne crinita (L. f.) Hook. f.
D. sciurea (R. Br.) Hook. f.
Deyeuxia gunniana (Nees.) Benth.—Upper Delegate R. at Bidwell (subalpine)
D. brachyathera (Stapf) J. W. Vickery—Cobberas & Nunniong Plateau (alpine)
D. quadriseta (Labill.) Benth.

D. monticola (Roem. & Schult.) J. W. Vickery
D. frigida F. Muell. ex Benth.—Cobberas, Wulgulmerang
D. densa Benth.—Cape Conran, Maramingo Ck (6 miles NE. of Genoa)
D. carinata J. W. Vickery—Cobberas (alpine)
D. minor F. Muell. ex Benth.—flats of Lower Cann R. & Reedy Ck
D. rodwayi J. W. Vickery—Mt. Ellery, Goonmirk Ra., Howe Ra.
D. crassiuscula J. W. Vickery—Cobberas & Wombargo Ra. (alpine)
D. benthamiana J. W. Vickery—Murrungowar Mtns.
D. microseta J. W. Vickery—Combienbar
D. scaberula J. W. Vickery—Murrungowar Mtns. & Mt. Ellery
D. contracta (F. Muell. ex Hook. f.) J. W. Vickery—Bairnsdale district
D. sp.—[*aff. D. angustifolia* J. W. Vickery] Ballantyne Hills near Suggan Buggan
Agrostis hiemalis (Walt.) Britton et al.
A. muelleriana J. W. Vickery—Cobberas (alpine)
A. parviflora R. Br.—Upper Delegate R. at Bidwell (subalpine)
A. venusta Trin.—Cobberas & Nunniong Plateau (subalpine)
A. billardieri R. Br.—Lakes Entrance, Ram Head, Mallacoota
A. aemula R. Br.—Cann R. valley
A. avenacea J. F. Gmel.
Echinopogon ovatus (Forst. f.) Pal. Beauv.
Pentapogon quadrifidus (Labill.) Baill.
Zoysia macrantha Desv.—Cape Conran, Wingan Inlet, Betka R. mouth
Tripogon loliiformis (F. Muell.) C. E. Hubbard—Suggan Buggan
Eragrostis elongata (Willd.) J. F. Jacq.—plains near Bairnsdale
E. brownii (Kunth) Nees ex Steud.
Chloris truncata R. Br.—Bairnsdale, Suggan Buggan
C. ventricosa R. Br.—Suggan Buggan
Cynodon dactylon (L.) Pers.
Sporobolus virginicus .(L.) Kunth—(coastal)
Phragmites communis Trin.
Enneapogon nigricans (R. Br.) Pal. Beauv.—Suggan Buggan, Upper Snowy R., Lower Bendoc, Upper Genoa R.
Danthonia paradoxa R. Br.—Maramingo Ck (6 miles NE. of Genoa)
D. pallida R. Br.
D. longifolia R. Br.—Tambo R., Wulgulmerang, Wingan Inlet, Howe Ra.
D. semiannularis (Labill.) R. Br.—Orbost, Wulgulmerang
D. induta J. W. Vickery—Suggan Buggan, Upper Snowy R.
D. alpicola J. W. Vickery—Cobberas, Mt. Tingaringy (subalpine)
D. eriantha Lindl.
D. setacea R. Br.—Kalimna
D. purpurascens J. W. Vickery—Bairnsdale district
D. caespitosa Gaudich.
D. laevis J. W. Vickery—Cobberas, Wulgulmerang
D. racemosa R. Br.
D. pilosa R. Br.
D. penicillata (Labill.) Pal. Beauv.
D. nudiflora P. F. Morris—Cobberas, Nunniong Plateau (alpine)
Aristida ramosa R. Br.—Suggan Buggan, Upper Snowy R., Deddick R. (rain-shadow belt)
Anisopogon avenaceus R. Br.—near-coastal
Stipa teretifolia Steud.—Cape Conran, Ram Head & Wingan Inlet, Mallacoota
S. semibarbata R. Br.—Bairnsdale, Suggan Buggan
S. hemipogon Benth.—Cape Conran, Genoa R. gorge, Mallaeoota
S. aristiglumis F. Muell.—Suggan Buggan
S. blackii C. E. Hubbard—Bairnsdale, Kalimna, Suggan Buggan
S. variabilis D. K. Hughes—Suggan Buggan
S. nervosa J. W. Vickery
S. pubescens R. Br.—Marlo, Buchan, Upper Snowy R. & Suggan Buggan
Panicum fulgidum D. K. Hughes—Maramingo Ck (6 miles NE. of Genoa)
P. effusum R. Br.—Bairnsdale, Buchan, Suggan Buggan, Deddick R.
Paspalidium gracile (R. Br.) D. K. Hughes—Suggan Buggan, Snowy R. gorge & Deddick R. (rain-shadow belt)
Entolasia marginata (R. Br.) D. K. Hughes
†*Oplismenus aemulus* (R. Br.) Kunth
Digitaria brownii (Roem & Schult.) D. K. Hughes—Suggan Buggan
Paspalum distichum L.—Bairnsdale, Orbost, Gabo Is.
Pseudoraphis paradoxa (R. Br.) Pilger—Lake King & Snowy R. near Orbost (? extinct)
Pennisetum compressum R. Br.—Delegate River (near N.S.W. border)
Isachne globosa (Thunb.)Kuntze—Suggan Buggan, Young's Ck near Orbost, Upper Cann R. valley
Spinifex hirsutus Labill.—Lakes Entrance, Coringle, Cape Conran, Gabo Is., Wingan Inlet
Hemarthria uncinata R. Br.—Sperm Whale Head, Lakes Entrance

Imperata cylindrica (L.) Pal. Beauv.
Sorghum leiocladum (Haek.) C. E. Hubbard—Buehan, Ingeegoodbee R.
Bothriochloa ambigua S. T. Blake—Buehan, W Tree, Suggan Buggan, Deddiek R.
Dichanthium sericeum (R. Br.) A. Camus—Suggan Buggan & Deddiek R. (rain-shadow belt)
Cymbopogon refractus (R. Br.) A. Camus—Orbost district, W Tree, Suggan Buggan & Deddiek R., Upper Cann R. valley
Themeda australis (R. Br.) Stapf

CYPERACEAE

Cyperus tenellus L. f.—Marlo, Cann R.
C. brevifolius (Rottb.) Hassk.—Bairnsdale, Suggan Buggan, Tubbut, Combienbar, Genoa
C. lucidus R. Br.
C. rotundus L.—Bairnsdale, Lakes Entrance
C. gunnii Hook f.—Cann River
C. sanguinolentus Vahl—Suggan Buggan, Cabbage-tree Ck, Noorinbee, Genoa
C. concinnus R. Br.—Upper Snowy & Deddiek Rivers
C. exaltatus Retz.—Bairnsdale
Scirpus americanus Pers.—Lower Snowy R.
S. nodosus Rottb.—(coastal)
S. validus Vahl—Sperm Whale Head, Bairnsdale, Wuk Wuk
S. polystachyus F. Muell.—Wulgulmerang, Bendoe, Upper Delegate R.
S. maritimus L.—Coringle, Sperm Whale Head
S. fluviatilis (Torr.) A. Gray—Bairnsdale, Newmerella, Brodribb R., Cann R.
S. forsythii Kükenth.—Genoa R. gorge
S. crassiusculus (Hook. f.) Benth.—Cobberas, Wombargo Ra., Upper Delegate R. (subalpine)
S. fluitans L.—Cann R., Lower Delegate R.
S. productus C. B. Clarke—Lake King, Delegate R.
S. antarcticus L.—Cann R., Upper Delegate R.
S. gunnii Boeck.—Mt. Kaye
S. cernuus Vahl
S. aucklandicus (Hook. f.) Boeck.—Cobberas, Nunniong Plateau (alpine)
S. montivagus S. T. Blake—Cobberas (alpine)
S. merrillii (Palla) Kükenth. ex Merrill—Cobberas, Upper Delegate R., Lower Bendoe
S. inundatus (R. Br.) Poir.
S. wakefieldianus S. T. Blake—Cann River district, Reedy Ck
S. stellatus C. B. Clarke—Marlo, Cann R.
S. calocarpus S. T. Blake—Cann R.
S. platycarpus S. T. Blake—Cann R.
Eleocharis sphacelata R. Br.—Mitchell R., Cann R., Wingan Inlet, Upper Delegate R.
E. gracilis R. Br.—Sarsfield, Tonghi Ck, Cann R. district, Ram Head, Delegate R., Genoa
E. acuta R. Br.
Cyathochaeta diandra (R. Br.) Nees—Between Mallaeoota & Betka R. mouth
Schoenus tenuissimus Benth.—Mallacoota
S. nitens (R. Br.) Poir.—Sperm Whale Head, Cape Conran, Ram Head
S. imberbis R. Br.—Sperm Whale Head, Betka R. mouth, Mallaeoota
S. brevifolius R. Br.—Marlo, Reedy Ck near Cann R.
S. melanostachys R. Br.
S. maschalinus Roem. & Schult.
S. apogon Roem. & Schult.
Tetraria capillaris (F. Muell.) J. M. Black—Reedy Ck near Cann R., Mallaeoota, Maramingo Ck (6 miles NE. of Genoa)
Cladium procerum S. T. Blake—Bairnsdale, Orbost district, Lake Curlip
Machaerina articulata (R. Br.) Koyama
M. tetragona (Labill.) Koyama—Newton's Ck near Orbost, Reedy Ck near Cann R., Genoa
M. rubiginosa (Spreng.) Koyama—Snowy R.
M. gunnii (Hook. f.) J. H. Kern—Upper Delegate R.
M. juncea (R. Br.) Koyama
Gahnia melanocarpa R. Br.
G. clarkei G. Benl
G. sieberiana Kunth—Mt. Ellery, Upper Delegate R., Genoa R., Howe Ra.
G. trifida Labill.—Sperm Whale Head, Rigby Is. near Lakes Entrance, Newmerella
G. filum (Labill.) F. Muell.—(coastal)
G. radula (R. Br.) Benth.
Lepidosperma longitudinale Labill.—Sperm Whale Head, Marlo
L. limicola N. A. Wakefield—Reedy Ck near Cann R., Maramingo Ck (6 miles NE. of Genoa)
L. gladiatum Labill.—(coastal)
L. concavum R. Br.—(near-coastal)
L. lineare R. Br.—Nunniong Plateau (alpine)
L. elatius Labill.
L. laterale R. Br.
L. tortuosum F. Muell.—Tonghi Plain, Upper Delegate R. at Bidwell

L. forsythii A. A. Hamilton—Tonghi Plain, Reedy Ck near Cann R., Maramingo Ck (6 miles NE. of Genoa)
L. neesii Kunth—Marlo, Reedy Ck near Cann R., Thurra R., Maramingo Ck
L. urophorum N. A. Wakefield
Gymnoschoenus sphaerocephalus (R. Br.) Hook. f.—Tambo R., near Orbost, Cape Conran, Reedy Ck near Cann R., Maramingo Ck
Caustis flexuosa R. Br.
C. pentandra R. Br.—Sperm Whale Head, Cann River to Tamboon Inlet, Wingan Inlet, Mallacoota
Oreobolus distichus F. Muell.—Cobberas, Nunniong Plateau (alpine)
Chorizandra cymbaria R. Br.—Tonghi Plain, Reedy Ck near Cann R., Mallacoota
Uncinia tenella R. Br.—Arte R., Mt. Ellery, Goonmirk Ra., Mt. Drummer
U. flaccida S. T. Blake—Cobberas (alpine)
Carex capillacea Boott—Cobberas to Wombargo Ra. (alpine)
C. appressa R. Br.
C. raleighii E. Nelmes—Upper Delegate R. at Bidwell (subalpine)
C. curta Gooden.—Cobberas (alpine)
C. inversa R. Br.—Bendoc, Tubbut, Wulgulmerang
C. gaudichaudiana Kunth
C. polyantha F. Muell.
C. longebrachiata Boeck.—Bairnsdale, Tambo R., Cann R.
C. iynx E. Nelmes—Cobberas
C. fascicularis Soland. ex Boott
C. breviculmis R. Br.
C. pumila Thunb.—Marlo, Cape Conran, Mallacoota
C. brownii Tuckerm.—sources of Bemm R.
C. blakei E. Nelmes—Cobberas, Nunniong Plateau (alpine)

PALMAE

Livistona australis (R. Br.) Mart.—Cabbage Tree Ck, Caley's Ck & Lower Brodribb R.

LEMNACEAE

Lemna minor L.—Sperm Whale Head
L. oligorrhiza Kurz—Lakes Entrance, Jarrahmond, Cann River
Wolffia arrhiza (L.) Hork. ex Wimm.—Cann River

RESTIONACEAE

Lepyrodia anarthria F. Muell.—Upper Genoa R., Maramingo Ck (6 miles NE. of Genoa)
L. muelleri Benth.—Cann R. & nearby Reedy Ck, Thurra R.
Restio tetraphyllus Labill.—Sperm Whale Head, Newton's Ck, Cape Conran, Reedy & Dinner Cks near Cann R., Wingan Inlet
R. complanatus R. Br.
R. australis R. Br.—(alps & subalps)
Leptocarpus brownii Hook. f.—Lakes Entrance, Cape Conran, Wingan Inlet
L. tenax (Labill.) R. Br.—Sperm Whale Head, Marlo, Tamboon Inlet, Mt. Drummer, Maramingo Ck (6 miles NE. of Genoa)
Hypolaena fastigiata R. Br.—Sperm Whale Head, Marlo, Mallacoota
Calorophus lateriflorus (R. Br.) F. Muell.

CENTROLEPIDACEAE

Centrolepis polygyna (R. Br.) Hieron—Sperm Whale Head
C. aristata (R. Br.) Roem. & Schult.—Marlo
C. fascicularis Labill.
C. strigosa (R. Br.) Roem. & Schult.

XYRIDACEAE

Xyris operculata Labill.
X. gracilis R. Br.—Reedy Ck near Cann R., Genoa R. (upper tract & gorge), Maramingo Ck (6 miles NE. of Genoa)
X. juncea R. Br.—Maramingo Ck

PHILYDRACEAE

Philydrum lanuginosum Banks ex J. Gaertn.—Bairnsdale district

JUNCACEAE

Luzula campestris, sp. agg.
Juncus maritimus Lam.—(coastal)
J. ingens N. A. Wakefield—McLeod's Morass at Bairnsdale, Brodribb R.
J. pauciflorus R. Br.—Bemm R., Lind & Alfred Nat. Parks, Mallacoota
J. pallidus R. Br.—Sperm Whale Head, Lakes Entrance, Genoa, Mallacoota
J. vaginatus R. Br.—Noorinbee Nth. (Cann R. valley)
J. usitatus L. A. S. Johnson—Snowy R., Genoa R.
J. sarophorus L. A. S. Johnson—Upper Delegate R., Noorinbee Nth.
J. australis Hook. f.—Tubbut-Deddick district
J. gregiflorus L. A. S. Johnson—Bemm R., Combienbar R., Noorinbee Nth., Genoa R.
J. filicaulis Buch.—Gelantipy
J. falcatus E. Mey.—(alps & subalps)
J. planifolius R. Br.
J. caespiticius E. Mey.—Coringle, Lower Snowy R., Ram Head, Gabo Is.

J. bufonius L.
J. revolutus R. Br.—Coringle near mouth of Snowy R.
J. homalocaulis F. Muell.—Mitchell R., Tambo R., Lake Tyers, Mallacoota
J. prismatocarpus R. Br.
J. pusillus Buch.—(alps & subalps)
J. holoschoenus R. Br.
J. fockei Buch.—Wombargo Ra., Upper Snowy R., Goongerah, Lower Bendoc

LILIACEAE

Xanthorrhoea minor R. Br.
X. australis R. Br.
X. resinosa Pers.—(coastal plains eastward from Marlo)
Lomandra filiformis (Thunb.) Britten
L. multiflora (R. Br.) Britten—Upper Cann R. & Mt. Kaye, Mt. Drummer, Upper Genoa R., Genoa Peak, Howe Ra.
L. glauca (R. Br.) Ewart—Murrungowar Rd., Maramingo Ck (6 miles NE. of Genoa)
L. longifolia Labill.
L. confertifolia (F. M. Bailey) A. Fahn—Mt. Kaye, Genoa Peak, Howe Ra.
Chamaescilla corymbosa (R. Br.) F. Muell. ex Benth.—Genoa, Mallaeoota
Caesia parviflora R. Br.—Newton's Ck, Coringle, Cann R.
C. vittata R. Br.
Arthropodium milleflorum (DC.) Maebride
A. minus R. Br.—Suggan Buggan, Tubbut (rain-shadow belt)
Dichopogon strictus (R. Br.) J. G. Baker—Bairnsdale
Thysanotus patersonii R. Br.—Sperm Whale Head, Bemm & Cann Rivers
T. tuberosus R. Br.
T. juncifolius (Salisb.) J. H. Willis & A. B. Court—Reedy Ck near Cann R., Mallacoota, Genoa, Maramingo Ck
Bulbine bulbosa (R. Br.) Haw.
B. semibarbata (R. Br.) Haw.—Bairnsdale, Murrungowar, Cann R.
Tricoryne elatior R. Br.
Laxmannia sessiliflora Decaisne—Tonghi Plain & Reedy Ck near Cann R., Betka R. head
L. gracilis R. Br.—Bairnsdale, Wulgulmerang, Maramingo Ck (6 miles NE. of Genoa), Mt. Elizabeth area
Sowerbaea juncea Sm.—(coastal plains eastward from Marlo)
Drymophila cyanocarpa R. Br.—Gelantipy, Upper Delegate R., Bendoe, Goonmirk Ra., Merragunegin Plateau
Dianella tasmanica Hook. f.
D. revoluta R. Br.
D. laevis R. Br.—Sperm Whale Head, Deadcock Ck, W Tree, Murrindal
D. caerulea Sims
Stypandra caespitosa R. Br.—Sperm Whale Head, Cann R., Upper Delegate R., Upper Genoa R., Canni Ck
S. glauca R. Br.
Schelhammera undulata R. Br.
Anguillaria dioica R. Br.—(open grassland around settlements)
Burchardia umbellata R. Br.
†*Geitonoplesium cymosum* (R. Br.) A. Cunn.
†*Eustrephus latifolius* R. Br.
†*Ripogonum album* R. Br.—Lower Brodribb R. & Lockend near Snowy R. mouth, Wingan R., Harrison's Ck in Howe Ra.
†*Smilax australis* R. Br.

HYPOXIDACEAE

Hypoxis hygrometrica Labill.
H. glabella R. Br.—Bairnsdale, Cann R., Upper Delegate R.

IRIDACEAE

Diplarrena moraea Labill.
Libertia pulchella (R. Br.) Spreng.—Mt. Ellery, heads of Delegate R.
L. paniculata (R. Br.) Spreng.—Cabbage Tree Ck, Genoa Gorge & Peak, Mallacoota
Patersonia fragilis (Labill.) Druce—(near-coastal grass-tree plains)
P. longiscapa Sweet—near Orbost
P. glabrata R. Br.
P. sericea R. Br.—Upper Genoa R., Howe Ra., Mallacoota
P. longifolia R. Br.—Confluence of Upper Genoa R. & Yambulla Ck

ORCHIDACEAE

Thelymitra grandiflora R. D. FitzG.—Marlo, between Tonghi & Cann R., Bonang
T. pauciflora R. Br.
T. aristata Lindl.
T. ixioides Swartz
T. media R. Br.—Yalmy R., Bonang, Combienbar
T. chasmogama R. S. Rogers—Orbost
T. irregularis W. H. Nicholls—Reedy Ck near Cann R.
T. retecta H. M. R. Rupp—Upper Delegate R. near Bidwell
T. venosa R. Br.—Upper Delegate R. near Bidwell, Maramingo Ck (6 miles NE. of Genoa)
T. cyanea (Lindl.) Benth.—Upper Delegate R. at Bidwell, Maramingo Ck
T. matthewsii Cheeseman—Cann R. & Genoa districts

T. rubra R. D. FitzG.—Gillingall near Buchan, Cann R.
T. carnea R. Br.—Store Ck near Bairnsdale, Marlo, Genoa
T. flexuosa Endl.—(near-coastal damp grass-tree plains eastward from Newmerella)
Calochilus campestris R. Br.—Orbost, Genoa
C. robertsonii Benth.
C. paludosus R. Br.—Reedy Ck near Cann R.
Diuris punctata Sm.—Bairnsdale, Tambo R. valley, Marlo
D. longifolia R. Br.—Marlo
D. maculata Sm.
D. sulphurea R. Br.
D. pedunculata R. Br.
Orthoceras strictum R. Br.—Marlo
Microtis atrata Lindl.—Mallacoota
M. oblonga R. S. Rogers
M. unifolia (Forst. f.) Reichenb. f.
M. parviflora R. Br.—Orbost & Marlo
Prasophyllum nigricans R. Br.—Sperm Whale Head, McKenzie R., Genoa Ck
P. viride R. D. FitzG.—Mallacoota
P. archeri Hook. f.—Nunniong Plateau & Wulgulmerang district
P. beaugleholei W. H. Nicholls—Upper Delegate R. at Bidwell
P. suttonii R. S. Rogers & R. Rees—Cobberas, Upper Delegate R. at Bidwell (alps & subalps)
P. brevilabre (Lindl.) Hook. f.
P. australe R. Br.—Orbost, Marlo, McKenzie R., Cann R., Thurra R.
P. alpinum R. Br.—Nunniong Plateau, Cobberas (alps)
P. flavum R. Br.—Upper Delegate R. at Bidwell, Bendoc, Mallacoota
P. elatum R. Br.—Genoa R.
P. odoratum R. S. Rogers—Cape Conran, Mallacoota
P. brainei R. S. Rogers—Marlo
P. parviflorum (Rogers) W. H. Nicholls—Bairnsdale, Marlo, Genoa Ck
P. rogersii H. M. R. Rupp—Mallacoota
P. appendiculatum W. H. Nicholls—Tonghi Plain near Cann R., Genoa Ck, Mallacoota
P. hartii R. S. Rogers—Bairnsdale
P. patens R. Br.—Orbost & Marlo, Club Terrace, Combienbar, Genoa R.
P. frenchii F. Muell.—Mallacoota
P. gracile R. S. Rogers—Bairnsdale, Suggan Buggan, Yalmy R.
Caleana major R. Br.
C. minor R. Br.—Sperm Whale Head, Bairnsdale district, Marlo
Spiculaea huntiana (F. Muell.) Schlechter—Nunniong Plateau, Orbost district, Bendoe, Mallacoota
Chiloglottis gunnii Lindl.
C. cornuta Hook. f.—Mt. Ellery, Yalmy R.
C. reflexa (Labill.) Druce
C. trapeziformis R. D. FitzG.—Bairnsdale-Paynesville district, Bruthen, Brodribb R., Cann R.
Acianthus caudatus R. Br.—Sperm Whale Head, Bairnsdale, Newmerella, Marlo, Reedy Ck near Cann R.
A. reniformis (R. Br.) Schlechter
A. exsertus R. Br.
Eriochilus cucullatus (Labill.) Reichenb. f.
Lyperanthus nigricans R. Br.
L. suaveolens R. Br.—Marlo, Noorinbee (Cann R. valley), Howe Ra.
Burnettia cuneata Lindl.—Reedy Ck near Cann R.
Caladenia menziesii R. Br.—Orbost, Cann R.
C. dilatata R. Br.
C. filamentosa R. Br.—Orbost, Cann R.
C. patersonii R. Br.—Marlo
C. pallida Lindl.—Cobberas, Goongerah & Mt. Ellery, Mt. Drummer, Upper Genoa R.
C. clavigera A. Cunn. ex Lindl.—Orbost, Canni Ck
C. tessellata R. D. FitzG.—Marlo
C. reticulata R. D. FitzG.
C. deformis R. Br.—Orbost & Mt. Raymond, Marlo, Genoa R., Mallacoota
C. latifolia R. Br.—Sperm Whale Head, Marlo, Cape Howe
C. alba R. Br.—Combienbar, Upper Genoa R.
C. aurantiaca (R. S. Rogers) H. M. R. Rupp—Marlo, Reedy Ck near Cann R., Genoa
C. carnea R. Br.
C. caerulea R. Br.
C. congesta R. Br.—Wulgulmerang, Bonang & Bendoc, Combienbar
C. lyallii Hook. f.—Wombargo Ra., Mt. Tingaringy (subalpine)
C. angustata Lindl.
C. testacea R. Br.—Wulgulmerang, Bonang, Mallacoota
C. iridescens R. S. Rogers—Sperm Whale Head
Glossodia major R. Br.—Sperm Whale Head, Mt. Kaye, Genoa R.
G. minor R. Br.—(coastal grass-tree plains eastward from Marlo)
Corybas fimbriatus (R. Br.) Reichenb. f.—Sperm Whale Head, Bairnsdale, Marlo, Genoa
C. diemenicus (Lindl.) H. M. R. Rupp—Sperm Whale Head, Bairnsdale, Lakes Entrance, Suggan Buggan, Genoa

C. dilatatus (Rupp & Nicholls) H. M. R. Rupp—Marlo
C. aconitiflorus Salisb.—Newmerella near Orbost, Marlo
C. unguiculatus (R. Br.) Reichenb. f.—Marlo
Cryptostylis hunteriana W. H. Nicholls—(near-coastal, damp grass-tree plains eastward from Marlo)
C. erecta R. Br.—Marlo
C. subulata (Labill.) Reichenb. f.—Lake King, Orbost & Marlo, Cape Conran, Cann R.
C. leptochila F. Muell. ex Benth.—Marlo, Cabbage Tree Ck, Murrungowar, Combienbar, Genoa R.
Pterostylis barbata Lindl.—Marlo, Reedy Ck near Cann R., Canni Ck
P. parviflora R. Br.—Sperm Whale Head, Suggan Buggan, Amboyne Ck, Bendoc & Bidwell, Marlo
P. cucullata R. Br.—Serpentine Ck near Yalmy R.
P. falcata R. S. Rogers—Orbost district, Noorinbee (Cann R. valley), Upper Delegate R. at Bidwell, Wulgulmerang
P. alpina R. S. Rogers—Bonang, Brodribb R., Combienbar
P. acuminata R. Br.—Orbost, Brodribb R.
P. grandiflora R. Br.—Marlo district, Mt. Raymond near Orbost
P. revoluta R. Br.—Sperm Whale Head, Suggan Buggan, Deddick R. & Amboyne Ck, Mt. Raymond near Orbost
P. decurva R. S. Rogers—Wulgulmerang & Suggan Buggan, Bendoc, Mt. Buck, Upper Cann R.
P. reflexa R. Br.—Mt. Raymond near Orbost, Cann River district, Mt. Kaye
P. obtusa R. Br.
P. alveata J. R. Garnet—Genoa
P. alata (Labill.) Reichenb. f.—Sperm Whale Head, Orbost
P. concinna R. Br.—Sperm Whale Head, Lakes Entrance, Orbost, Cann R.
P. pedoglossa R. D. FitzG.—Marlo, Mallacoota
P. pedunculata R. Br.
P. nana R. Br.—Marlo, Mallacoota
P. nutans R. Br.
P. curta R. Br.—Sperm Whale Head, Orbost, Cann R., Genoa, Mallacoota
P. baptistii R. D. FitzG.—Cann River, Genoa & Scrubby Cks, Maramingo Ck (6 miles NE. of Genoa)
P. longifolia R. Br.
P. cycnocephala R. D. FitzG.—Nunniong Plateau, Cobberas, Suggan Buggan
P. mutica R. Br.—Sperm Whale Head, Wulgulmerang district, Suggan Buggan
P. pusilla R. S. Rogers—Suggan Buggan, Cann R.
Gastrodia sesamoides R. Br.—Deadcock Ck, Orbost district, Cann R., Combienbar, Bendoc
Spiranthes sinensis (Pers.) Ames—Bendoc, Upper Delegate R. at Bidwell, Snowy R., Brodribb R.
Dendrobium speciosum Sm.—Genoa R. (gorge & upper tracts near N.S.W. border), towards Genoa Peak, Howe Ra.
D. striolatum Reichenb. f.—(rock faces, often granitic)
Dipodium punctatum (Sm.) R. Br.
†*Plectorrhiza tridentata* (Lindl.) A. W. Dockrill
Sarcochilus australis (Lindl.) Reichenb. f.—Mitchell R. gorge tract, Orbost district, Upper Combienbar R., Cann R.
†*S. falcatus* R. Br.—Noorinbee (Cann R. valley), Howe Ra.

DICOTYLEDONS

CASUARINACEAE

Casuarina stricta Dryand.
C. littoralis Salisb.
C. nana Sieber ex Spreng.—junction of Upper Genoa R. & Yambulla Ck (at N.S.W. border)
C. paludosa Sieber ex Spreng.—(near-coastal damp heaths)
C. pusilla E. D. Macklin—Sperm Whale Head

ULMACEAE

†*Trema aspera* (Brongn.) Blume—Mallacoota Inlet (?extinct)

MORACEAE

†*Ficus coronata* Spin.—Mallacoota district (Harrison's & Smellie's Cks)

URTICACEAE

Urtica incisa Poir.
Parietaria debilis Forst. f.
Australina muelleri Wedd.

PROTEACEAE

Persoonia confertiflora Benth.
P. silvatica L. A. S. Johnson—between Bonang & Bendoc, Upper Delegate R. at Bidwell, Goonmirk Ra.
P. juniperina Labill.
P. rigida R. Br.—Dellicknora
P. chamaepeuce Lhotsk. ex Meissn.—Nunniong Plateau, Cobberas, Mt. Stradbroke, Amboyne Ck., Bonang-Bendoc district (subalpine)
?*P. myrtilloides* Sieber ex Schult. & Schult. f.—Yambulla Ck near junction with

Upper Genoa R. (at N.S.W. border)
P. linearis Andr.
P. lucida R. Br.—(near-coastal heaths eastward from Ram Head)
P. levis (Cav.) Domin—(near-coastal heaths eastward from Ram Head)
Conospermum taxifolium Sm.—coast opposite Gabo Is.
Grevillea sp. [aff. G. aquifolium]—Brumby Point on Nunniong Plateau (above Reedy R. gorge), Mt. Stradbroke, Upper Buchan R.
G. rosmarinifolia A. Cunn.—heads of Buchan & Suggan Buggan Rivers
G. australis R. Br.—Nunniong Plateau, Cobberas & near Wulgulmerang (alpine & subalpine)
G. parviflora R. Br.
G. lanigera A. Cunn. ex R. Br.
G. alpina Lindl.—Nowa Nowa
G. chrysophaea F. Muell. ex Meissn.—Sperm Whale Head, Buchan Rd.
G. victoriae F. Muell—Nunniong Plateau, Cobberas, Wombargo Ra., near W Tree, Mt. Tingaringy (alpine & subalpine)
G. miqueliana F. Muell.—Ingeegoodbee R. below Cobberas, Back Ck in Cann R. district
Hakea eriantha R. Br.
H. dactyloides (J. Gaertn.) Cav.—Mt. Kaye (Upper Cann R. area), Mallacoota Inlet & Howe Ra.
H. ulicina R. Br.—Bruthen to Buchan Rd., Cann R., Wingan Inlet, Genoa
H. teretifolia (Salisb.) J. Britt.—Cann R., Genoa, Mallacoota
H. nodosa R. Br.—Sperm Whale Head
H. sericea Schrad. & J. Wendl.
H. lissosperma R. Br.—Nunniong Plateau, Cobberas (alpine)
H. microcarpa R. Br.—(subalpine, also Deddick & Snowy Rivers)
Orites lancifolia F. Muell.—Nunniong Plateau, Mt. Ellery (subalpine)
Telopea oreades F. Muell.—(higher damper forests)
Lomatia fraseri R. Br.—(higher forests)
L. ilicifolia R. Br.
L. myricoides (J. Gaertn.) Domin—(riparian, also montane)
Banksia spinulosa Sm.—(near-coastal forests eastward from Cann R., also Mt. Kaye & Upper Genoa R.)
B. serrata L. f.—(near-coastal heaths & light forests)
B. marginata Cav.
B. canei J. H. Willis—Brumby Point on Nunniong Plateau (above Reedy R.), Wulgulmerang district (subalpine)
B. integrifolia L. f.—(coastline)

SANTALACEAE

Exocarpos nanus Hook. f.—Cobberas, Wulgulmerang district (alps & subalps)
E. strictus R. Br.
E. cupressiformis Labill.
Choretrum pauciflorum A. DC.—Orbost, Yalmy R., Wulgulmerang, Nunniong Plateau, Amboyne Ck near Tubbut
Leptomeria acida R. Br.—Wingan R., Genoa Peak, Wangrabelle, Upper Genoa R.
Omphacomeria acerba (R. Br.) A. DC.—Nunniong Plateau, Wulgulmerang district, Suggan Buggan, Bonang, Wingan R., Upper Genoa R.
Santalum obtusifolium R. Br.—Genoa R. (near Genoa & at confluence with head of Mallacoota Inlet)
Thesium australe R. Br.—Lake King, Gillingal (NW. of Murrindal West Parish), Wulgulmerang

OLACACEAE

Olax stricta R. Br.—swampy heaths in area between Tamboon Inlet, Cape Everard and Dinner Ck (S. of Cann River)

LORANTHACEAE

Muellerina eucalyptoides (DC.) B. A. Barlow
M. celastroides (Sieber ex Schult. & Schult. f.) Van Tiegh.—on coastal *Banksia integrifolia* eastward from Bairnsdale
Amyema miquelii (Lehm. ex Miq.) Van Tiegh.
A. pendulum (Sieber ex Spreng.) Van Tiegh.
A. quandang (Lindl.) Van Tiegh.—on *Acacia* spp. at Buchan, Murrindal and Deddick R.
Dendrophthoë vitellina (F. Muell.) Van Tiegh.—Mallacoota
Notothixos subaureus D. Oliver—Mallacoota, parasitic on *Dendrophthoë* & *Muellerina*)
Korthalsella japonica (Thunb.) Engler—Orbost district, Brodribb R. near junction of Cabbage Tree Ck, Mallacoota (on *Eugenia smithii*)

POLYGONACEAE

Rumex bidens R. Br.—Marlo
R. brownii Campd.
Polygonum plebeium R. Br.—Mitchell R.
P. strigosum R. Br.—Newmerella, Upper Snowy R., Cann R., Wingan Inlet
P. prostratum R. Br.
P. hydropiper L.
P. minus Huds.

P. subsessile R. Br.—Newmerella, Cabbage Tree Ck
P. lapathifolium L.
P. lanigerum R. Br.—Snowy R.
Muehlenbeckia adpressa (Labill.) Meissn.—(coastal sand-hummocks)
M. axillaris (Hook. f.) Walp.—Wulgulmerang, Snowy R.
M. gracillima Meissn.—Cann R., Genoa
M. rhyticarya F. Muell.—Glenaladale Nat. Park, Ensay & Tambo R. above Bruthen
M. diclina (F. Muell.) Druce—Rcedy R. gorge, Mt. Stradbroke & Suggan Buggan, Upper Snowy & Deddick Rivers

CHENOPODIACEAE

Rhagodia baccata (Labill.) Moq.—(coastal)
R. hastata R. Br.—Suggan Buggan, Amboyne Ck near Tubbut, Bairnsdale, Orbost
R. nutans R. Br.
Chenopodium trigonon Schult.—Tambo R., near Orbost, Gabo Is.
C. pseudomicrophyllum Aellen—Suggan Buggan (rain-shadow belt)
C. glaucum L.—Coringle, Wingan Inlet, Mallacoota, Gabo Is. (saline flats)
C. carinatum R. Br.—Suggan Buggan & Snowy R. gorge
C. pumilio R. Br.—Upper Snowy R., Sperm Whale Head
Atriplex billardieri (Moq.) Hook. f.—Mallacoota
A. cinerea Poir.—Lakes Entrance
A. muelleri Benth.—Bairnsdale
Enchylaena tomentosa R. Br.—Bairnsdale, Mallacoota
Salsola kali L.—Suggan Buggan & Upper Snowy R., Mallacoota
Suaeda australis (R. Br.) Moq.—(coastal salt-marsh)
Salicornia quinqueflora Bunge ex Ung.-Sternb.—(coast-line)
Hemichroa pentandra R. Br.—Sperm Whale Head (salt-marsh)

AMARANTHACEAE

Alternanthera denticulata R. Br.—(coastal districts)

NYCTAGINACEAE

Boerhaavia diffusa L.—Suggan Buggan (rain-shadow belt)

AIZOACEAE

Tetragonia implexicoma (Miq.) Hook. f.—(coastal)
T. tetragonioides (Pallas) O. Kuntze—Sperm Whale Head, Lakes Entrance, Wingan & Mallacoota Inlets
Disphyma australe (Soland.) J. M. Black—(coastal rocks & salt-marsh)

PORTULACACEAE

Portulaca oleracea L.—Sperm Whale Head & Bairnsdale, Suggan Buggan, Upper Snowy R., Deddick R., Gabo Is.
Calandrinia calyptrata Hook. f.
C. eremaea Ewart—Suggan Buggan, junction of Snowy & Deddick Rivers
Montia australasica (Hook. f.) Pax & Hoffm.
M. fontana L.—Ingeegoodbee (near Cobberas)

CARYOPHYLLACEAE

Gypsophila australis (Schlechtendal) A. Gray—Suggan Buggan, Amboyne Crossing on Deddick R. (rain-shadow belt)
Stellaria pungens Brongn.
S. flaccida Hook.
S. palustris Ehrh. ex Retz.—Sperm Whale Head, Wulgulmerang, Bonang-Bendoc area & Upper Delegate R.
S. multiflora Hook.—Suggan Buggan, Mt. Tingaringy
Sagina apetala L.—Sperm Whale Head & Bairnsdale, Suggan Buggan, Cann R., Genoa R. (gorge & upper tracts)
S. procumbens L.—Cape Conran, Gabo Is.
Spergularia rubra (L.)J. & C. Presl.—Sperm Whale Head, Bairnsdale, Orbost, Cann R.
S. media (L.) C. Presl.—Sperm Whale Head, Lakes Entrance, Mallacoota Inlet (saline flats)
Scleranthus singuliflorus (F. Muell.) Mattf.—Cobberas (alpine)
S. biflorus (Forst. & Forst. f.) Hook. f.
S. diander R. Br.—(chiefly subalpine, from Nunniong Plateau to Goonmirk Ra.)

CERATOPHYLLACEAE

Ceratophyllum demersum L.—Pound Swamp at Bairnsdale, Tonghi Ck

RANUNCULACEAE

Clematis aristata R. Br. ex DC.
C. glycinoides DC.
C. microphylla DC.
Ranunculus trichophyllus Chaix—Little R. at Wulgulmerang
R. millanii F. Muell.—Nunniong Plateau to Cobberas (alpine and subalpine)
R. pimpinellifolius Hook.—Nunniong Plateau, Cobberas, Wombargo Ra. & Wulgulmerang district (alps & subalps)
R. plebeius R. Br. ex DC.

R. lappaceus Sm.
R. rivularis Banks & Soland. ex DC.
R. inundatus R. Br. ex DC.—Bairnsdale, Wulgulmerang, Upper Delegate R.
R. papulentus R. Melville—Wulgulmerang, Newmerella near Orbost
R. collinus R. Br. ex DC.—Nunniong Plateau, Wombargo Ra., Wulgulmerang district (subalpine)
R. sessiliflorus R. Br. ex DC.

MENISPERMACEAE

†*Sarcopetalum harveyanum* F. Muell.

WINTERACEAE

Drimys lanceolata (Poir.) Baill.—(higher mountain forests)
D. xerophila Parment.—Cobberas, Wombargo Ra., Mt. Tingaringy, Delegate R. head, Mt. Ellery (subalpine)

EUPOMATIACEAE

†*Eupomatia laurina* R. Br.

MONIMIACEAE

Hedycarya augustifolia A. Cunn.
Atherosperma moschiatum Labill.—Bonang, Goonmirk Ra., Arte R., Mt. Ellery, Mt. Kaye

LAURACEAE

Cassytha glabella R. Br.—Sperm Whale Head, Murrungowar Rd., Marlo, Cann R.
C. pubescens R. Br.
C. melantha R. Br.
C. phaeolasia F. Muell.

PAPAVERACEAE

Papaver aculeatum Thunb.—Deadeock Ck, Suggan Buggan, Deddick R., upper Snowy R. (rain-shadow belt)

CRUCIFERAE

Rorippa islandica (Oeder) Borb.—Bairnsdale, Cann R., Tamboon Inlet (wet places)
Cardamine ? debilis Banks ex DC.
C. laciniata F. Muell.—Suggan Buggan & Willis (at N.S.W. border), Cann R.
C. stylosa DC.—Goonmirk Ra. Combienbar, Mt. Kaye, Wingan Inlet, Howe Ra.
C. distyosperma Hook.—Mt. Ellery, Combienbar Ra., Mt. Elizabeth, W Tree
C. tenuifolia Hook.—Tonghi Ck (near Cann R.)
Drabastrum alpestre (F. Muell.) O. E. Schultz—Suggan Buggan (rain-shadow belt)
Stenopetalum lineare R. Br.—Suggan Buggan (rain-shadow belt)
Lepidium hyssopifolium Desv.
Cakile edentula (Bigelow) Hook.—(seacoast)

DROSERACEAE

Drosera pygmaea DC.—Coringle, Cape Conran, Ram Head & Wingan Inlet, Mallacoota
D. spatlulata Labill.—Cann R., Wingan Inlet, Maramingo Ck
D. binata Labill.—Cabbage Tree Ck, Cann R. & Tamboon Inlet, Genoa Ck, Upper Delegate R. at Bidwell
D. auriculata Backh. ex Planch.
D. peltata Sm.—Upper Delegate R. at Bidwell, Upper Genoa R., Cann R.
D. planchonii Hook. f.—Sperm Whale Head

CRASSULACEAE

Crassula sieberiana (Schult. & Schult. f.) Druee
C. macrantha (Hook. f.) Diels
C. peduncularis (Sm.) Mcigen—Cape Conran, Cann R.
C. helmsii (Kirk) Berger—Suggan Buggan, Newton's Ck, Coringle, Cann R.
C. pedicellosa (F. Muell.) Ostenf.—Cann R. falls

BAUERACEAE

Bauera rubioides Andr.

PITTOSPORACEAE

Pittosporum undulatum Vent.
P. bicolor Hook.—Bonang, Goonmirk Ra., Mt. Ellery, Mt. Kaye
P. revolutum Dryand.—Genoa R. & Gipsy Point
Marianthus procumbens (Hook.) Benth.
Bursaria spinosa Cav.
Billardiera scandens Sm.
B. longiflora Labill.—Bonang & Bendoc districts, Goonmirk Ra., Wingan Inlet

ROSACEAE

Rubus parvifolius L.
†*R. rosifolius* Sm.
†*R. hillii* F. Muell.
A. ovina A. Cunn.
A. anserinifolia (Forst. & Forst. f.) Druee

MIMOSACEAE

Acacia [species arranged alphabetically]
A. aculeatissima Maebride—(eastward from Brodribb R.)
A. amoena H. Wendl.—Suggan Buggan, Upper Snowy & Deddick Rivers (rain-shadow belt)
A. armata R. Br.—between Bairnsdale & Bullumwaal, Suggan Buggan

A. boormanii Maiden—Emu Egg Ck at head of Buehan R., Wulgulmerang & Suggan Buggan, Snowy R. (in and above gorge tract)
A. botrycephala (Vent.) Desf.
A. buxifolia A. Cunn.—Gelantipy, Suggan Buggan & Wulgulmerang district
A. dealbata Link
A. diffusa Lindl.
A. doratoxylon A. Cunn.—Buchan, Upper Snowy R., Suggan Buggan
A. falciformis DC.
A. floribunda (Vent.) Willd.—Buehan, Snowy, Deddiek & Genoa Rivers
A. frigescens J. H. Willis—Result Ck near Bonang, Yalmy R.
A. gunnii Benth.—Nunniong Plateau, Wulgulmerang, Suggan Buggan, Bendoc, Dellicknora, Upper Genoa R.
A. implexa Benth.
A. kybeanensis Maiden & Blakely—Nunniong Plateau (NE. slopes), Wulgulmerang district, Butcher's Ridge
A. lanigera A. Cunn.—Broadbent R. (near Snowy R. gorge tract), Genoa R. (gorge & upper reaches)
A. longifolia (Andr.) Willd.—(near-coastal)
A. lucasii Blakely—Brumby Point at NE. extremity of Nunniong Plateau (above Reedy R. gorge)
A. maidenii F. Muell.—Newmerella near Orbost (?extinct)
A. mearnsii De Wildeman
A. melanoxylon R. Br.
A. mucronata Willd. ex H. Wendl.
A. myrtifolia (Sm.) Willd.
A. obliquinervia M. D. Tindale—(chiefly montane to subalpine)
A. obtusifolia A. Cunn.—Snowy R. gorge, Murrungowar Mtns.
A. oxycedrus Sieber—Sperm Whale Head & Bairnsdale, Bruthen, Marlo
A. paucijuga F. Muell. ex N. A. Wakefield—Wulgulmerang district, Suggan Buggan & Upper Snowy R. valley (in *Eucalyptus albens* forest)
A. pravissima F. Muell.—Wulgulmerang (at Black Mountain), Bete Bolong (?extinct)
A. pugioniformis H. Wendl.—Bruthen-Buchan road, Wingan R.
A. pycnantha Benth.—(along and west of Brodribb R.)
A. rubida A. Cunn.—Murrindal, Wulgulmerang & Suggan Buggan areas
A. siculiformis A. Cunn. ex Benth.—Cobberas, Wombargo Ra., Wulgulmerang & Gelantipy districts (chiefly subalpine)
A. silvestris M. D. Tindale—Nowa Nowa, Murrindal Ck, Wulgulmerang-Gelantipy area, Upper Snowy R., Deddiek R. & Amboyne Ck.
A. sophorae (Labill.) R. Br.—Sperm Whale Head, Lakes Entrance, Gabo Is. (coastal)
A. stricta (Andr.) Willd.
A. suaveolens (Sm.) Willd.—(coastal & near-coastal)
A. subporosa F. Muell.—(along & eastward from Bemm R.)
A. ulicifolia (Salisb.) A. B. Court—Sperm Whale Head, Suggan Buggan, Snowy R.
A. verniciflua A. Cunn.—Bairnsdale district, Upper Delegate R., Howe Ra.
A. verticillata (L'Hérit.) Willd.

CAESALPINIACEAE

Cassia aciphylla Benth.— rocky slopes of Tambo, Snowy, Suggan Buggan, Deddiek & Genoa Rivers

PAPILIONACEAE

Mirbelia oxyloboides F. Muell.—(montane & subalpine forests)
Oxylobium alpestre F. Muell.—(alps & subalps)
O. arborescens R. Br.—Suggan Buggan, Lind Nat. Park
O. ellipticum (Labill.) R. Br.—(montane & subalpine)
O. ilicifolium (Andr.) Domin—Upper Combienbar, Gipsy Point near Mallacoota, Upper Genoa R.
O. procumbens F. Muell.—Dellicknora, Bonang & Bendoc districts
Gompholobium glabratum Sieber ex DC.—Mt. Kaye & Upper Cann R. valley
G. huegelii Benth.—Sperm Whale Head, Mt. Kaye, Upper Delegate R., Upper Genoa R.
G. latifolium Sm.—Bruthen-Buehan road, Snowy R., between Wingan & Genoa Rivers, Howe Ra.
Sphaerolobium vimineum Sm.—(near-coastal heaths)
Viminaria juncea (Schrad. & J. Wendl.) Hoffmannsegg—Sperm Whale Head, Nowa Nowa district, Brodribb R., Tamboon Inlet
Daviesia wyattiana F. M. Bailey—Mt. Kaye, near Wangrabelle
D. buxifolia Benth.—Upper Genoa R.
D. latifolia R. Br.
D. mimosoides R. Br.
D. ulicifolia Andr.
Pultenaea cunninghamii (Benth.) H. B. Williamson—Mt. Deddick
P. daphnoides J. Wendl.
P. polifolia A. Cunn.—Dellicknora
P. benthamii F. Muell.—Mt. Kaye
P. gunnii Benth.—sources of Bemm R.

P. scabra R. Br.—Bruthen-Buchan road, Brodribb R., Bemm R., Howe Ra. & Mallacoota
P. retusa Sm.
P. capitellata Sieber ex DC.—Upper Delegate R. at Bidwell, near Bendoc
P. paleacea Willd.—near Cape Conran, sources of Brodribb & Bemm Rivers, Upper Genoa R.
P. stricta Sims—Colquhoun State Forest near Nowa Nowa, Howe Ra.
P. linophylla Schrad.—Orbost, Cann R.
P. muelleri Benth.—Cobberas, Wombargo Ra., Wulgulmerang district, Suggan Buggan, Amboyne Ck, Mt. Tingaringy (chiefly subalpine)
P. juniperina Labill.
P. procumbens A. Cunn.—Tubbut
P. largiflorens F. Muell. ex Benth.—Bruthen
P. altissima F. Muell. ex Benth.—Upper Genoa R. (at N.S.W. border)
P. subumbellata Hook.—Nunniong Plateau, Cobberas, Ingeegoodbee R., Bonang, Newton's Ck, McKenzie R.
P. viscosa R. Br. ex Benth.— Bullumwaal
P. mollis Lindl.—Orbost district, Bellbird Ck, Mt. Elizabeth
P. fasciculata Benth.—Cobberas, Upper Delegate R. at Bidwell (alps & subalps)
P. humilis Benth. ex Hook. f.—Bairnsdale, Colquhoun, Bruthen to Buchan, Snowy R.
P. subspicata Benth.—Wulgulmerang, Deddick
P. hispidula R. Br. ex Benth.—Nowa Nowa district, Orbost to Brodribb R., Cann R., Mt. Drummer, Genoa
Aotus ericoides (Vent.) G. Don—(coastal heaths)
Dillwynia juniperina Lodd.—Buchan & Gelantipy districts, Wulgulmerang, Brodribb R.
D. sericea A. Cunn.
D. retorta (J. Wendl.) Druce—Reedy R. gorge, Buchan R., Wulgulmerang, Upper Genoa R.
D. prostrata Blakely—Wulgulmerang district
D. glaberrima Sm.—(near-coastal)
D. capitata J. H. Willis—Mt. Stradbroke near Wulgulmerang
D. cinerascens R. Br.—Bruthen-Buchan Rd.
Platylobium formosum Sm.
Bossiaea foliosa A. Cunn.—Cobberas & Wombargo Ra., Nunniong Plateau (alpine)
B. heterophylla Vent.—Sperm Whale Head & Lake King, Bairnsdale, Genoa to N.S.W. border
B. obcordata (Vent.) Druce—Sperm Whale Head & Bairnsdale, Deadcock Ck, Bullumwaal, Tambo R., Upper Cann R.
B. buxifolia A. Cunn.—Wulgulmerang, Suggan Buggan, Bendoc, Delegate R.
B. prostrata R. Br.
B. cinerea R. Br.—Sperm Whale Head
B. bracteosa F. Muell. ex Benth.—W Tree, Wulgulmerang district, Nunniong Plateau, Reedy R., Bendoc (subalpine)
B. ensata Sieber ex. DC.—(coastal heaths on and east of Betka R.)
Hovea heterophylla A. Cunn. ex Hook. f.
H. longifolia R. Br.—Nunniong Plateau, Cobberas, Wombargo Ra., Mt. Kaye (alps & subalps)
Goodia lotifolia Salisb.
Lotus australis Andr.—Suggan Buggan, Deddick R., Upper Delegate R. at Bidwell
Indigofera australis Willd.
Psoralea adscendens F. Muell.—(montane to subalpine)
P. tenax Lindl.—Deddick R. (between Deddick & Tubbut)
Swainsona oroboides F. Muell. ex Benth.—Suggan Buggan (rain-shadow belt), Wulgulmerang
Desmodium varians (Labill.) Endl.
D. brachypodum A. Gray—Bairnsdale district, Tabberabbera, Suggan Buggan, Upper Snowy R., Deddick R.
Lespedeza juncea (L. f.) Pers.—Suggan Buggan, Bete Bolong, Upper Snowy R., Deddick R.
Kennedia prostrata R. Br.
K. rubicunda (Schneev.) Vent.
Hardenbergia violacea (Schneev.) Stearn
Glycine clandestina J. Wendl.
G. tabacina (Labill.) Benth.—Bairnsdale, Sperm Whale Head, Deadcock Ck, Suggan Buggan

GERANIACEAE

Geranium homeanum Turcz.—Mallacoota
G. solanderi R. C. Carolin
G. potentilloides L'Hérit. ex DC.
G. neglectum R. C. Carolin—Upper Delegate R. at Bidwell, Bendoc
G. antrorsum R. C. Carolin—Cobberas, Nunniong Plateau (alpine)
G. sessiliflorum Cav.—Little R. above Wulgulmerang
Erodium crinitum R. C. Carolin—Buchan, Deddick R., Suggan Buggan, Orbost
Pelargonium inodorum Willd.—Reedy R. gorge (against Nunniong Plateau), Mt. Tingaringy, Thurra R.
P. australe Willd.

OXALIDACEAE

Oxalis corniculata L.

LINACEAE

Linum marginale A. Cunn. ex Planch.

RUTACEAE

Boronia nana Hook.—Bullumwaal, Wulgulmerang, Reedy Ck, Maramingo Ck
B. algida F. Muell.—Nunniong Plateau, Upper Buchan R. near Wombargo Ra., Cobberas area (alpine)
B. anemonifolia A. Cunn.—Sperm Whale Head, Nunniong Plateau, head of Buchan R., Suggan Buggan, Mt. Kaye, Upper Genoa R.
B. pilosa Labill.—Tabberabbera
B. muelleri (Benth.) E. Cheel—(eastward from Orbost)
B. ledifolia (Vent.) J. Gay—Mt. Elizabeth, near Tambo & Timbarra R. confluence, near W Tree, Snowy R. gorge
B. parviflora Sm.—near Cape Conran, Dinner & Reedy Cks (near Cann R.)
Zieria veronicea (F. Muell.) Benth.—Sperm Whale Head
Z. cytisoides Sm.—near Tabberabbera, Ballantyne Hills above Suggan Buggan, Snowy R. above gorge traet, Howe Ra., Gabo Is., Upper Genoa R.
Z. smithii Andr.
Eriostemon myoporoides DC.—W Tree Ck falls (N. of Buchan)
E. trachyphyllus F. Muell.
Crowea exalata F. Muell.—Nowa Nowa, Tambo R. above Bruthen, W Tree Ck falls, Suggan Buggan
Phebalium phylicifolium F. Muell.—Cobberas (alpine)
P. lamprophyllum (F. Muell.) Benth.—Reedy R. gorge (against Nunniong Plateau), Suggan Buggan, Snowy & Little R. gorges, Amboyne & Gattamurrh Cks, Upper Genoa R.
P. glandulosum Hook.—Upper Snowy R. (in and above gorge tract)
P. squamulosum Vent.
P. ozothamnoides F. Muell.—Wulgulmerang (in gorge country), Mt. Tingaringy (near summit)
P. sp. [*aff P. squameum* (Labill.) Engl.]—Mt. Elizabeth, near Ensay, Wulgulmerang Ck
Asterolasia trymalioides F. Muell.—Cobberas & Playground Top to south (alpine)
A. asteriscophora (F. Muell.) Druce—Upper Genoa R.
Correa alba Andr.—Bairnsdale, Wingan Inlet, Ram Head, Mallacoota, Gabo Is. (coastal)
C. lawrenciana Hook.—(chiefly montane)
C. reflexa (Labill.) Vent.
†*Acronychia laevis* Forst. & Forst. f.—Mitchell R. gorges, Lake King, Lakes Entrance, Bruthen, Brodribb R., Orbost district

TREMANDRACEAE

Tetratheca ciliata Lindl.—Mt. Stradbroke near Suggan Buggan, Mt. Kaye, Upper Genoa R.
T. ericifolia Sm.
T. pilosa Labill.
T. glandulosa Labill.—Murrungowar road (NE. of Orbost), Upper Genoa R.
T. subaphylla Benth.—Mt. Elizabeth area, Murrindal & W Tree, Combienbar, Mt. Kaye, sources of Genoa R.

POLYGALACEAE

Polygala japonica Houtt.—Murrindal West & W Tree, Little R. at Wulgulmerang
Comesperma volubile Labill.
C. ericinum DC.
C. retusum Labill.—Cobberas, Ingeegoodbee R., Wulgulmerang, Upper Delegate R. at Bendoc & Bidwell (subalpine)
C. defoliatum F. Muell.—(Coastal grass-tree plains east from Brodribb R.)
C. calymega Labill.—Sperm Whale Head (heathland)

EUPHORBIACEAE

Phyllanthus gunnii Hook. f.
P. hirtellus F. Muell. ex Muell.-Arg.—(chiefly coastal)
Adriana glabrata Gaudich.—(in and east from Tambo R. valley)
Euphorbia drummondii Boiss.—Suggan Buggan, Deddiek R. (rain-shadow belt)
Poranthera microphylla Brongn.
P. corymbosa Brongn.—between Wingan & Genoa Rivers
Micrantheum hexandrum Hook. f.—Bairnsdale-Sarsfield area, W Tree, Nunniong Plateau, Snowy R. gorge, Genoa R. gorge
Pseudanthus ovalifolius F. Muell.—Sperm Whale Head
P. divaricatissimus (Muell.-Arg.) Benth.—Genoa Peak, Howe Ra.
Ricinocarpos pinifolius Desf.—(coastal & near-coastal)
Bertya cunninghamii Planch.—Suggan Buggan area, Upper Snowy R. above McKillop's Bridge
Beyeria leschenaultii (DC.) Baill.—Lake King
B. viscosa (Labill.) Miq.—near Lakes Entrance, Little R. gorge near Wulgulmerang, Suggan Buggan area, Snowy R., Upper Genoa R.
B. lasiocarpa Muell.-Arg.—Bairnsdale-Sarsfield area, Snowy R. gorge, Genoa
Amperea xiphoclada (Sieber ex Spreng.) Druce

CALLITRICHACEAE

Callitriche muelleri Sond.—Snowy R., Bemm R., Mt. Ellery, Cann R., Mt. Drummer

CELASTRACEAE

†*Celastrus subspicatus* Hook.—Bairnsdale, Lakes Entrance, Bruthen, Orbost district

STACKHOUSIACEAE

Stackhousia spathulata Sieber ex Spreng.—near Bairnsdale, Lakes Entrance (coastal dunes)
S. monogyna Labill.
S. intermedia F. M. Bailey—Maramingo Ck (6 miles NE. of Genoa)

SAPINDACEAE

Alectryon subcinereus (A. Gray) Radlk.—junction of Stony Ck & Genoa R. (near gorge tract)
Dodonaea triquetra J. Wendl.—(chiefly east of Snowy R.)
D. rhombifolia N. A. Wakefield—gorge tracts of Snowy & Little Rivers
D. cuneata Sm.
D. viscosa (L.) N. J. Jacq.
D. angustissima DC.—Suggan Buggan, Snowy R. gorge, Deddick R., Gipsy Point & Genoa R.
D. boroniifolia G. Don—Genoa R.

RHAMNACEAE

Pomaderris multiflora Sieber ex Fenzl—Bairnsdale district, Buchan, Snowy R. gorge, Genoa, Upper Genoa R.
P. vacciniifolia Reiss.—Ingeegoodbee district
P. costata N. A. Wakefield—Brodribb R., Upper Genoa R. (at N.S.W. border), Howe Ra.
P. sieberiana N. A. Wakefield—Bullumwaal, Bellbird, Mt. Kaye, Howe Ra.
P. pilifera N. A. Wakefield—Wentworth R., Bruthen-Buchan road, near W Tree
P. discolor (Vent.) Poir.—Tambo R., Brodribb R., Bonang Highway (13 miles beyond Orbost), Tonghi Ck, Wingan Inlet, Mallacoota
P. ligustrina Sieber ex DC.—Monkey Ck near Bruthen, Bruthen, Orbost, mouth of Betka R. near Mallacoota
P. affinis N. A. Wakefield—Bellbird district, Wulgulmerang, Genoa R.
P. feruginea Sieber ex Fenzl—Snowy R., Genoa R.
P. sericea N. A. Wakefield—Upper Genoa R.
P. ledifolia A. Cunn.—Mt. Kaye, Ingeegoodbee R.
P. andromedifolia A. Cunn.—(east of Tambo R.)
P. betulina A. Cunn.—Bairnsdale-Sarsfield area, Bruthen, Suggan Buggan, Deddick R., Genoa R.
P. angustifolia N. A. Wakefield—Mitchell R. gorges, Wulgulmerang district, Ingeegoodbee R., Deddick R., Genoa R.
P. helianthemifolia (Reiss.) N. A. Wakefield—Upper Genoa R.
P. phylicifolia Lodd.—Bairnsdale-Sarsfield area, Wulgulmerang, Suggan Buggan, Deddick R., Upper Genoa R.
P. elachophylla F. Muell.—Wulgulmerang, Ingeegoodbee district, SE. of Bendoe
P. oraria F. Muell. ex Reiss.—(chiefly coastal, also at Buchan, Murrindal & Snowy R. gorge)
P. prunifolia A. Cunn. ex Fenzl—Mitchell R. gorges, Tambo R. near Bruthen, Genoa R. gorge
P. cotoneaster N. A. Wakefield—Upper Genoa R.
P. aspera Sieber ex DC.
P. eriocephala N. A. Wakefield—near Bruthen, Orbost, Genoa, Upper Genoa R.
P. subcapitata N. A. Wakefield—Ensay, Buchan, near W Tree, Suggan Buggan, Deddick R.
P. velutina J. H. Willis—S. slopes of Nunniong Plateau, near W Tree, Suggan Buggan
P. aurea N. A. Wakefield—Buchan, Upper Genoa R.
P. lanigera (Andr.) Sims—(east from Orbost)
P. pauciflora N. A. Wakefield— Reedy R. gorge (against Nunniong Plateau), Suggan Buggan R., Deddick R., Upper Genoa R.
P. pallida N. A. Wakefield—Ingeegoodbee
Spyridium parvifolium (Hook.) F. Muell.—Mt. Drummer, Wingan Inlet
S. cinereum N. A. Wakefield—near Mallacoota aerodrome (coastal heath)
Cryptandra amara Sm.—Nunniong Plateau, Wulgulmerang, Suggan Buggan, Deddick R. & Amboyne Ck, Cann R. valley
Discaria pubescens (Brongn.)Druce—Native Dog Ck near head of Buchan R., Wulgulmerang, Bendoe-Delegate district

VITACEAE

†*Cissus hypoglauca* A. Gray

ELAEOCARPACEAE

Elaeocarpus holopetalus F. Muell.—(chiefly montane)
E. reticulatus Sm.

MALVACEAE

Howittia trilocularis F. Muell.
Gynatrix pulchella (Willd.) Alef.—Mitchell R. gorges, Wentworth R., Tambo R., Buchan, Suggan Buggan, near Orbost
Lawrencia spicata Hook.—Sperm Whale Head, Mallacoota Inlet (in salt-marsh)

STERCULIACEAE

Brachychiton populneus R. Br.—near Nangurner, Mitchell R. gorges, Buchan, Suggan Buggan, Upper Snowy R., Deddick R., Errinundra, Upper Cann R.
Rulingia pannosa R. Br.— Murrindal (near Buchan)
R. prostrata Maiden & Betche—Sperm Whale Head
Commersonia fraseri J. Gay—Mt. Ellery, Errinundra R., Combienbar R., Club Terrace, Genoa R. (incl. gorge tract), Howe Ra.
Lasiopetalum ferrugineum Sm.—Genoa R. gorge
L. dasyphyllum Sieber ex Hook. f.—(east from Tambo R.)

DILLENIACEAE

Hibbertia spathulata N. A. Wakefield—Snowy R. gorge, ?Mt. Elizabeth
H. serpyllifolia R. Br. ex DC.—Mitchell R. gorges, Wulgulmerang district, between Cann & Thurra Rivers, Genoa R. gorge.
H. pedunculata R. Br. ex DC.—Wulgulmerang, Ingeegoodbee district, Upper Snowy R. (incl. gorge), Genoa R. gorge
H. dentata R. Br. ex DC.—(eastward from Orbost)
H. virgata R. Br. ex DC.—Mt. Taylor near Bairnsdale, Nowa Nowa, Orbost, Marlo, Genoa
H. fasciculata R. Br. ex DC.—Sperm Whale Head, Little Ram Head, Mallacoota (coastal heathland)
H. obtusifolia DC.
H. diffusa R. Br. ex DC.—Upper Genoa R., Howe Ra.
H. calycina (DC.) N. A. Wakefield—between Bairnsdale & Deptford
H. stricta (DC.) R. Br. ex F. Mucll.—Genoa R.
H. rufa N. A. Wakefield—Reedy Ck (3 miles east of Cann River)
H. acicularis (Labill.) F. Muell.—Sperm Whale Head, Lakes Entrance, near Orbost, Tamboon Inlet, Upper Genoa R. (chiefly coastal)
H. sericea (R. Br. ex DC.) Benth.—Sperm Whale Head, Bruthen-Buchan road, Nowa Nowa
H. aspera DC.—Bruthen district, sources of Brodribb R., Genoa & Mallacoota
H. astrotricha (Sieber ex Spreng.) N. A. Wakefield

EUCRYPHIACEAE

†*Eucryphia moorei* F. Muell.—Howe Ranges

HYPERICACEAE

Hypericum gramineum Forst. f.
H. japonicum Thunb.—Cobberas, Wulgulmerang, Upper Delegate R. at Bidwell, Ram Head & Wingan Inlet (damp shaded ground)

ELATINACEAE

Elatine gratioloides A. Cunn.—Orbost, Genoa R. gorge (on mud)

FRANKENIACEAE

Frankenia pauciflora DC.—Sperm Whale Head (in salt-marsh)

VIOLACEAE

Viola betonicifolia Sm.
V. caleyana G. Don—Dellicknora Ck, Deddick R., Brodribb R., mouth of Genoa R., Delegate R.
V. hederacea Labill.
V. sieberiana Spreng.—Nunniong Plateau, Upper Delegate R. at Bidwell (alps & subalps)
Hybanthus filiformis (DC.) F. Muell.—Mitchell R., Nicholson R. (at Yahoo Ck), sources of Amboyne & Gattamurrh Cks (above Tubbut), Mt. Tingaringy
H. vernonii (F. Muell.) F. Muell.—Marlo, between Little Ram Head & Mallacoota, Genoa R. (coastal heaths)
Hymenanthera dentata R. Br. ex DC.

PASSIFLORACEAE

Passiflora cinnabarina Lindl.—Suggan Buggan, Snowy R. (east of Gelantipy), Orbost & Mt. Buck, Mt. Kaye, Genoa Peak, Genoa R. gorge, Yalmy R.

THYMELAEACEAE

Pimelea curviflora R. Br.—Suggan Buggan district, Upper Genoa R.
P. biflora N. A. Wakefield—Nunniong Plateau, Cobberas (alpine)
P. axiflora F. Muell. ex Meissn.—Goonmirk Ra., Lind Nat Park, Mt. Drummer, Yalmy R.
P. pauciflora R. Br.—Ingeegoodbee R.
P. humilis R. Br.
P. glauca R. Br.—Sperm Whale Head, Bairnsdale, Wulgulmerang & Suggan Buggan, Snowy R.
P. ligustrina Labill.—(montane)

P. alpina F. Muell. ex Meissn.—Nunniong Plateau, Cobberas (alpine)
P. linifolia Sm.—Bruthen, Wulgulmerang, Amboyne Ck, Marlo, Gipsy Point to Mallacoota, Howe Ra.

LYTHRACEAE

Lythrum hyssopifolia L.—near Mt. Drummer
L. salicaria L.—Lake King, Bonang, sources of Delegate R., Snowy R. gorge

MYRTACEAE

†*Eugenia smithii* Poir.
†*Tristania laurina* R. Br.
Angophora floribunda (Sm.) Sweet—Genoa, Mallacoota, Howe Ra.
Eucalyptus [species arranged alphabetically]
E. albens Benth.—Suggan Buggan to Upper Snowy & Deddick River valleys (rain-shadow belt)
E. andreana Naudin—(riparian, eastward from Tambo R.)
E. aromaphloia L. D. Pryor & J. H. Willis—between Cann River & Tamboon Inlet
E. bauerana Schauer—Mitchell R. gorges, between Sperm Whale Head & Nowa Nowa, Upper Genoa R.
E. baxteri (Benth.) Maiden & Blakely—Mt. Kaye, E. of Butcher's Ridge
E. bicostata Maiden et al.
E. blakelyi Maiden—Snowy R. gorge
E. bosistoana F. Muell.—Bairnsdale to Nowa Nowa, Snowy R. gorge, Cann R., Genoa R. (Genoa to Wangrabelle)
E. botryoides Sm.—(near-coastal, from Lake King eastward to Thurra R.)
E. bridgesiana R. T. Baker—Bairnsdale, Nowa Nowa, Bruthen-Buchan Rd., Suggan Buggan, Upper Snowy & Deddick Rivers, near Orbost
E. camphora R. T. Baker—Tongio, Wulgulmerang tableland, Delegate R., Bemm R. (montane to subalpine)
E. cephalocarpa Blakely—(swampy flats between Bairnsdale & Thurra R.)
E. consideniana Maiden—Bairnsdale district, Bruthen-Buchan Rd., near Wulgulmerang, Howe Ra.
E. cypellocarpa L. A. S. Johnson
E. dalrympleana Maiden—Nunniong & Wulgulmerang tablelands, Upper Delegate R., sources of Amboyne Ck & Mt. Tingaringy (usually subalpine)
E. delegatensis R. T. Baker—Nunniong Plateau, Wombargo Ra., Goonmirk Ra., heads of Errinundra & Combienbar Rivers, Mt. Ellery (montane to subalpine)
E. dives Schauer
E. fastigata Deane & Maiden—Bonang-Bendoc district (incl. Delegate R.), Goonmirk Ra., Lind Nat. Park, Mt. Kaye
E. glaucescens Maiden & Blakely—Nunniong Plateau, Mt. Stradbroke above Suggan Buggan, Mt. Wheeler (above Snowy R. at McKillop's Bridge), Mt. Tingaringy (subalpine), Little R. gorge
E. globoidea Blakely
E. goniocalyx F. Muell. (sens. strict.)—Cassilis, Wulgulmerang & Suggan Buggan, Amboyne Ck
E. gummifera (J. Gaertn.) Hochr.—Wingan Inlet, Mallacoota Inlet & Howe Ra., lower Genoa R.
E. kybeanensis Maiden & Cambage—Brumby Point on Nunniong Plateau, Mt. Seldom Seen near Wulgulmerang, Mt. Wheeler above Snowy R. at McKillop's Bridge (subalpine)
E. macrorhyncha F. Muell. ex Benth.—(westward from Brodribb R.)
E. maculata Hook.—between Nowa Nowa & Mt. Tara Ra.
E. maidenii F. Muell.—Lakes Entrance, Nowa Nowa, Cann R., Mallacoota
E. mannifera Mudie—Buchan R. & Nunniong Plateau, Wombargo Ra., Wulgulmerang, Snowy R. gorge, Bonang,
E. melliodora A. Cunn. ex Schauer—(westward from Brodribb R.)
E. muellerana A. W. Howitt
E. nitens (H. Deane & Maiden) Maiden—Bonang to Goonmirk Ra., Mt. Ellery, Mt. Kaye (montane to subalpine)
E. obliqua L'Hérit.
E. ovata Labill.
E. pauciflora Sieber ex Spreng.—(chiefly montane to alpine)
E. perriniana F. Muell. ex Rodway—Nunniong Plateau (near Digger's Holes & Reedy R. gorge)
E. pilularis Sm.—Howe Ra.
E. polyanthemos Schauer—Mitchell R. gorges, Bairnsdale, 10 miles E. of Bruthen, Mt. Kaye, Upper Genoa R.
E. radiata Sieber ex DC.
E. regnans F. Muell.—Mts. Baldhead, Elizabeth & Bindi (NW. portion of East Gippsland), Yalmy R. (E. of Snowy)
E. rubida H. Deane & Maiden—(northern montane tracts)
E. sideroxylon A. Cunn. ex W. Woolls—Bairnsdale district, Bruthen, Lakes Entrance to Nowa Nowa, Gipsy Point near Mallacoota
E. sieberi L. A. S. Johnson
E. smithii R. T. Baker—Wulgulmerang, Genoa Peak, Genoa R. (gorge tract & upper reaches), Howe Ra.
E. stellulata Sieber ex DC.—(subalpine

tablelands from Mt. Baldhead to Cobberas & Upper Delegate R.)
E. tereticornis Sm.—Sperm Whale Head, Bairnsdale, Lakes Entrance, Bruthen
E. viminalis Labill.
Leptospermum laevigatum (J. Gaertn.) F. Muell.—(coastal)
L. myrsinoides Schlechtendal—Sperm Whale Head, Bairnsdale, Bruthen, Nowa Nowa
L. attenuatum Sm.—(near-coastal heaths, eastward from Marlo)
L. brevipes F. Muell.—Bruthen-Buchan Rd., Nunniong Plateau, Mt. Stradbroke near Wulgulmerang, Mt. Tingaringy, Genoa R. & Mallacoota district
L. emarginatum Wendl. f. ex Link—Sarsfield, Nowa Nowa, Genoa R. in and above gorge tract (riparian)
L. phylicoides (A. Cunn. ex Schauer) E. Cheel
L. juniperinum Sm.
L. scoparium Forst. & Forst. f.—(chiefly riparian)
L. obovatum Sweet—Mitchell R. gorges, Bairnsdale & Sarsfield, Nowa Nowa (riparian)
L. micromyrtus Miq.—Cobberas, Mt. Tingaringy (alpine)
L. myrtifolium Sieber ex DC.—(swampy tracts of alps & subalpine tablelands)
L. grandifolium Sm.—(riparian in montane and subalpine tracts)
L. glabrescens N. A. Wakefield—Reedy Ck near Cann R., E. of Butcher's Ridge
L. lanigerum (Ait.) Sm.—(swampy flats in lowlands)
Kunzea parvifolia Schauer—Wulgulmerang district, Snowy R. gorge
K. ambigua (Sm.) Druce—Mt. Kaye, Genoa & Genoa R., Mallacoota, Howe Ra.
Callistemon citrinus (Curt.) Stapf.—Bairnsdale district, Canni Ck (Bruthen-Buchan road), Orbost district (16 miles to west), Thurra R., Genoa, Upper Genoa R.
C. subulatus E. Cheel—Tonghi Ck near Cann R., Wingan Inlet, Genoa R. (gorge & upper branches), Nowa Nowa
C. sieberi DC.—Nunniong Plateau, Cobberas, Ingeegoodbee, Upper Delegate R. at Bidwell, Bendoc (alps & subalps)
C. paludosus F. Muell.—(riparian)
C. pallidus (Bonpl.) DC.—Reedy R. gorge (against Nunniong Plateau), Mt. Stradbroke near Wulgulmerang, Buchan district, Mt. Tingaringy summit (rocky declivities), Mt. Elizabeth
Melaleuca squarrosa Donn ex Sm.—(swampy lowland tracts)
M. armillaris (Soland. ex J. Gaertn.) Sm.—Ram Head & Wingan Inlet, Genoa Peak, Mallacoota, Genoa & Genoa R. gorge, Howe Ra.
M. ericifolia Sm.—(swampy lowland flats & stream-banks)
Baeckea virgata (Forst. & Forst. f.) Andr.—(stream-banks between Bairnsdale & Genoa)
B. linifolia Rudge—Cann R., Mallacoota Inlet, Genoa R., Maramingo Ck (6 miles NE. of Genoa)
B. ramosissima A. Cunn.—Sperm Whale Head, Marlo, Mallacoota
B. gunniana Schauer—Nunniong Plateau, Cobberas (alpine)
B. utilis F. Muell. ex Miq.—(montane to alpine bogs, also Maramingo Ck 6 miles NE. of Genoa)
Calytrix tetragona Labill.
Thryptomene micrantha Hook. f.—Sperm Whale Head
Micromyrtus ciliata (Sm.) Druce—Mt. Stradbroke near Wulgulmerang, Snowy R. gorge
Darwinia camptostylis B.G. Briggs—'East Gippsland' (?vicinity of Cape Howe)

ONAGRACEAE

Epilobium cinereum A. Rich.
E. pallidiflorum Soland. ex A. Cunn.—Combienbar valley
E. billardierianum Ser. ex DC.
E. gunnianum Hausskn.—(montane to alpine)
E. tasmanicum Hausskn.—Rocky Plain N. of Wombargo Ra. (subalpine)
Ludwigia peploides (Kunth.) P. H. Raven—Lake King, Bairnsdale, ½ mile S. of Orbost (aquatic)

HALORAGACEAE

Haloragis elata A. Cunn. ex Fenzl—Wulgulmerang (Boundary Ck)
H. tetragyna (Labill.) Hook. f.
H. teucrioides (DC) Schlechtendal
H. serpyllifolia (Hook. f.) Walp.—Upper Delegate R. at Bidwell
H. depressa (A. Cunn.) Walp.—Ingeegoodbee, Bendoc (subalpine)
H. heterophylla Brongn.—Gelantipy, Wulgulmerang district, Suggan Buggan, Bendoc
H. brownii (Hook. f.) Schindl.—mouth of Snowy R. (?extinct)
H. micrantha (Thunb.) Siebold & Zucc.
H. racemosa Labill.—Ballantyne Hills above Suggan Buggan, Mt. Tingaringy
Myriophyllum pedunculatum Hook. f.—Cobberas, Wombargo Ra., Upper Dele-

gate R. at Bidwell (bogs in alps & subalps)
M. propinquum A. Cunn.—(aquatic)
M. verrucosum Lindl.—Orbost, Deddick R., Genoa R. gorge, Genoa, Buchan, Murrindal, Wulgulmerang (aquatic)
M. elatinoides Gaudich.—Bairnsdale, Orbost district, Genoa R. gorge (aquatic)

ARALIACEAE

Tieghemopanax sambucifolius (Sieber ex DC.) Viguier
T. multifidus N. A. Wakefield—Bruthen district, Nowa Nowa, Mt. Tara, W Tree, Wulgulmerang district, Mt. Tingaringy, Mt. Buck near Orbost
Astrotricha asperifolia F. Muell. ex Klatt —Sperm Whale Head, Bonang, Wingan Inlet, Mt. Elizabeth
A. ledifolia DC.—Mt. Ellery
A. linearis A. Cunn. ex Benth.—Mitchell R.
A. crassifolia Blakely—Ballantyne Hills above Suggan Buggan, Snowy R. gorge

UMBELLIFERAE

Hydrocotyle verticillata Thunb.—Lake King & Bairnsdale, Suggan Buggan, Newmerella, Marlo, Cann R., Dellicknora Ck (in swamps)
H. laxiflora DC.
H. hirta R. Br. ex A. Rich.
H. sibthorpioides Lam.
H. algida N. A. Wakefield—Wombargo Ra. (alpine)
H. acutiloba (F. Muell.) N. A. Wakefield—Mt. Drummer, Upper Genoa R., Howe Ra.
H. tripartita R. Br. ex. A. Rich.
H. pterocarpa F. Muell.—Lake Tyers, Brodribb R. (east of Orbost), Ram Head, Cann R. & Tonghi Ck
H. geraniifolia F. Muell.—Arte R., Mt. Ellery, Bemm R., Lind Nat. Park, Howe Ra.
H. callicarpa Bunge—Sperm Whale Head, Murrungowar, Combienbar, Cann R., Genoa Ck
Centella cordifolia (Hook f.) Nannfeldt—(damp flats)
Trachymene anisocarpa (Turcz.) B. L. Burtt—Nunniong Plateau, Mt. Stradbroke near Wulgulmerang, Mt. Tingaringy (subalpine)
T. humilis (Hook. f.)Benth.—Cobberas, Wulgulmerang district, Upper Delegate R. at Bidwell (alps & subalps)
Platysace ericoides (Sieber ex DC.) Norman—near mouth of Snowy R.
P. lanceolata (Labill.) Norman
P. heterophylla (Benth.) Norman—Bruthen-Buchan road, Cann R. & Tamboon Inlet
Xanthosia tridentata DC.—Club Terrace, Cann R., Mt. Kaye, Howe Ra.
X. pilosa Rudge—(eastward from Snowy R.)
X. dissecta Hook. f.—Club Terrace, Cann R., Howe Ra.
X. pusilla Bunge—near Cape Conran, Mallacoota, Howe Ra.
Schizeilema fragoseum (F. Muell.) Domin—Cobberas (alpine)
Oschatzia cuneifolia (F. Muell.) Drude—Cobberas, heads of Buchan R., Wombargo Ra. (subalpine)
Oreomyrrhis eriopoda (DC.) Hook. f.—(alps & subalps)
O. brevipes Mathias & Constance—Cobberas (alpine)
O. argentea (Hook. f.) Hook. f.—Nunniong Plateau (subalpine)
O. pulvinifica F. Muell.—Wulgulmerang
Apium prostratum Vent.—(coastal)
A. leptophyllum (Pers.) F. Muell. ex Benth.—Bairnsdale, Marlo, Club Terrace
Sium latifolium L.—Bairnsdale, Lower Nicholson R., near Orbost, Tubbut (marshy terrain)
Sesseli harveyanum F. Muell.—Cobberas, Wombargo Ra. (alpine & sub-alpine)
Lilaeopsis polyantha (Gandoger) Hj. Eichler—Snowy R. (on mud)
Aciphylla glacialis (F. Muell.) Benth.—Cobberas (alpine)
A. simplicifolia (F. Muell.) Benth.—Cobberas, Wombargo Ra., sources of Delegate R., Mt. Tingaringy (alps & subalps)
Daucus glochidiatus (Labill.) Fisch. et al.

ERICACEAE

Gaultheria appressa A. W. Hill.—Nunniong Plateau, Wombargo Ra., Cobberas, Upper Delegate R. at Bidwell, Goonmirk Ra., Mt. Ellery, Mt. Tingaringy, Mt. Kaye (subalpine)

EPACRIDACEAE

Styphelia adscendens R. Br.—Genoa
Astroloma humifusum (Cav.) R. Br.
A. pinifolium (R. Br.) Benth.—Sperm Whale Head
Melichrus urceolatus R. Br.—Suggan Buggan, Deddick R. & Amboyne Ck, Dellicknora, Bonang district
Lissanthe strigosa (Sm.) R. Br.—Wombargo Ra., Wulgulmerang & Suggan Buggan, Snowy R. gorge, Cann R., Mt. Kaye

Leucopogon lanceolatus (Sm.) R. Br.—(eastward from Snowy R.)
L. gelidus (F. Muell. ex Benth.) N. A. Wakefield—Nunniong Plateau, Cobberas, Wombargo Ra., Mt. Tingaringy Bonang district, Mt. Ellery (subalpine)
L. parviflorus (Andr.) Lindl.—Lakes Entrance, Marlo, Gabo Is. (coastal)
L. australis R. Br.—Lakes Entrance, Martin's Ck (?30 miles NE. of Orbost)
L. thymifolius Lindl. ex Benth.—Bonang
L. collinus (Labill.) R. Br.—Marlo to Cape Conran, Orbost, Lower Cann R., Genoa R. (near-coastal)
L. pilifer N. A. Wakefield—Nunniong Plateau along sources of Timbarra R. (alpine)
L. pilibundus A. Cunn. ex DC.—Gelantipy, Bonang, Upper Genoa R.
L. virgatus (Labill.) R. Br.—(westward from Brodribb R.)
L. suaveolens Hook. f.—(alps & subalps)
L. montanus (R. Br.)J. H. Willis—Cobberas (alpine)
L. maccraei F. Muell.—Nunniong Plateau, Cobberas, Upper Delegate R. at Bidwell, Goonmirk Ra., Mt. Ellery (subalpine & montane)
L. attenuatus A. Cunn.—Nunniong Plateau, Cobberas, Wulgulmerang district, Mt. Tingaringy, Snowy R., Martin's Ck (30 miles NE. of Orbost), Mt. Kaye, Genoa Peak (chiefly subalpine)
L. ericoides (Sm.) R. Br.—(coastal heaths)
L. riparius N. A. Wakefield—Bete Bolong Ck, Snowy R. east of Butcher's Ridge
L. esquamatus R. Br.—Marlo & Cabbage Tree Ck
L. biflorus R. Br.—(subalpine tablelands)
L. stuartii F. Muell. ex Sond.—Wulgulmerang, Upper Delegate R. at Bidwell, Bonang & Bendoc, Mt. Kaye, Upper Genoa R. & Maramingo Ck
L. juniperinus R. Br.—Mitchell R. gorges, Mt. Nowa Nowa, Murrindal R. (NE. of Buchan)
Acrotriche serrulata (Labill.) R. Br.
A. divaricata R. Br.—Nunniong Plateau (Reedy R. gorge), Mt. Stradbroke & Wulgulmerang district, Mt. Elizabeth
Monotoca elliptica (Sm.) R. Br.—coastal
M. scoparia (Sm.) R. Br.
M. rotundifolia J. H. Willis—Brumby Point at NE. edge of Nunniong Plateau
Brachyloma daphnoides (Sm.) Benth.
Epacris impressa Labill.
E. obtusifolia Sm.—(coastal heaths eastward from Snowy R.)
E. lanuginosa Labill.—Wingan Inlet
E. paludosa R. Br.—(chiefly subalpine)
E. breviflora Stapf—Nunniong Plateau, Cobberas, Ingeegoodbee, Wulgulmerang district, Mt. Tingaringy (subalpine)
E. petrophila Hook. f.—heads of Timbarra R. on Nunniong Plateau
E. ?serpyllifolia R. Br.—Cobberas, Wombargo Ra. (alpine)
E. microphylla R. Br.—(subalpine traets, also Genoa Peak)
Sprengelia incarnata Sm.—Cape Conran, Lower Bemm R.
Richea continentis B. L. Burtt—Nunniong Plateau & Forlorn Hope Plain, Cobberas (alpine)

MYRSINACEAE

Rapanea howittiana F. Muell. ex Mez—(near-coastal gullies, also Snowy R. gorge)

PRIMULACEAE

Lysimachia salicifolia F. Muell. ex Benth.—near mouth of Snowy R. (?extinct)
Samolus repens (Forst. & Forst. f.) Pers.—(saline flats and cliffs along coast)
S. valerandii L.—Mitchell R. gorges, near Bairnsdale, Tambo R. (between Tongio & Sandy Ck), Suggan Buggan, Snowy R.

OLEACEAE

†*Notelaea longifolia* Vent.
N. ligustrina Vent.—(montane & subalpine forests eastward from Tambo R.)

LOGANIACEAE

Mitrasacme serpyllifolia R. Br.—between the Tambo & Nicholson Rivers, Upper Delegate R. at Bidwell, Cann R., McKenzie R., Maramingo Ck (6 miles NE. of Genoa)
M. pilosa Labill.—Mt. Kaye, Mallacoota
M. polymorpha R. Br.—Orbost, near Alfred Nat. Park, Mallacoota, Howe Ra.
Logania albiflora (Andr.) Druce—W Tree, Mt. Stradbroke (above Suggan Buggan), Mt. Tingaringy, Upper Genoa R., Howe Ra.
L. pusilla R. Br.—mouth of Betka R. (near Mallacoota)

GENTIANACEAE

Gentianella diemensis (Griseb.) J. H. Willis—Cobberas, Nunniong Plateau, Ingeegoodbee, Bonang-Bendoc region, Upper Delegate R. & Goonmirk Ra. (chiefly subalpine)
Sebaea albidiflora F. Muell.—Sperm Whale Head

S. ovata (Labill.) R. Br.—Sperm Whale Head, Wulgulmerang & Suggan Buggan

MENYANTHACEAE

Villarsia exaltata (Soland. ex Sims) G. Don.—Newmerella, Marlo to Cape Conran, Cann R. & Reedy Ck (subaquatic)

V. reniformis R. Br.—Newmerella (subaquatic)

Nymphoides geminata (R. Br.) O. Kuntze—Nunniong Plateau (Bentley's Plain), Rocky Plain toward Cobberas, Wulgulmerang district, Upper Delegate R. at Bidwell (aquatic & subalpine)

APOCYNACEAE

Alyxia buxifolia R. Br.—(Sea-coast from Lakes Entrance eastward)

Parsonsia brownii (J. Britten) Pichon—(chiefly in stream-side forests)

ASCLEPIADACEAE

Tylophora barbata R. Br.

Marsdenia rostrata R. Br.

†*M. flavescens* A. Cunn.—Bairnsdale area, Lakes Entrance, Pipe-clay Ck near Orbost

CONVOLVULACEAE

Convolvulus erubescens Sims—Bairnsdale, Wulgulmerang & Suggan Buggan

Calystegia marginata R. Br.—Sperm Whale Head, Snowy R., Brodribb R. & Cabbage Tree Ck, Mt. Drummer

C. sepium (L.) R. Br.—Mitchell R. gorges, Bairnsdale

C. soldanella (L.) R. Br.—Cape Howe (coastal)

Dichondra repens Forst. & Forst. f.

Wilsonia backhousei Hook. f.—Sperm Whale Head, Mallacoota, Betka R. (in salt-marsh)

CUSCUTACEAE

Cuscuta australis R. Br.—Snowy R. (? extinct)

BORAGINACEAE

Myosotis australis R. Br.

M. suaveolens (R. Br.) Poir.—Snowy R., Upper Bendoc

Omphalolappula concava (F. Muell.) Brand.—Suggan Buggan (rain-shadow belt)

Cynoglossum latifolium R. Br.—Mitchell R. gorges, Bemm R. & Arte R., Lind Nat. Park, Cann R., Mt. Drummer, Howe Ra.

C. suaveolens R. Br.—Wulgulmerang, Mt. Stradbroke & Suggan Buggan, Bruthen, Cann R.

C. australe R. Br.—Mitchell R. gorges, Bairnsdale, Lake Tyers, Suggan Buggan, Snowy R. at McKillop's Bridge, Amboyne Ck, Upper Murrungowar

VERBENACEAE

Verbena officinalis L.—Swift's Ck, Suggan Buggan, Karlo Ck (near Mt. Drummer)

LABIATAE

Plectranthus parviflorus Willd.

Mentha laxiflora Benth.—Reedy R. gorge (against Nunniong Plateau), Wulgulmerang district, Mt. Ellery

M. australis R. Br.—Bairnsdale, Bindi, Wulgulmerang & Suggan Buggan, Snowy R., Delegate R. district, Goonmirk Ra.

M. diemenica Spreng.—Suggan Buggan, Orbost, Mt. Drummer

M. satureioides R. Br.—W Tree to Black Mountain at Wulgulmerang, Nowa Nowa

Lycopus australis R. Br.—Bonang & Delegate R., Newmerella, Howe Ra.

Salvia plebeia R. Br.—Tambo R., Buchan R. & Snowy R. (?extinct), Deddick R.

Prunella vulgaris L.

Scutellaria humilis R. Br.

S. mollis R. Br.—Genoa R. gorge, near Genoa, Mallacoota, Howe Ra.

Prostanthera lasianthos Labill.

P. melissifolia F. Muell.—Howe Ra.

P. rotundifolia R. Br.

P. hirtula F. Muell. ex Benth.—Nowa Nowa district, Buchan-W Tree road, Genoa Peak, Genoa, Howe Ra.

P. denticulata R. Br.—Snowy & Brodribb Rivers, Bruthen-Buchan road, Wairewa (6 miles ENE. of Nowa Nowa), Mt. Elizabeth

P. cuneata Benth.—Cobberas (alpine)

P. phylicifolia F. Muell.—Nunniong Plateau, Wulgulmerang & Mt. Stradbroke, Mt. Tingaringy, Mt. Kaye (subalpine)

P. decussata F. Muell.—N.S.W. border on Monument Ridge (above Upper Amboyne Ck)

P. walteri F. Muell.—W Tree, Mt. Elizabeth, Mt. Ellery, Mt. Kaye (subalpine)

Westringia cremnophila N. A. Wakefield—Snowy R. gorge (E. of 'Tulloch Ard' H.S.)

W. eremicola A. Cunn. ex Benth.—Little R. gorge near Wulgulmerang, Bemm R., Cann R., Genoa R. (gorge tract & upper reaches)

W. glabra R. Br.—Happy Valley (SE. of Nowa Nowa), W Tree Ck falls (14 miles N. of Buchan), Snowy R. gorge, Combienbar, Timbarra R.

Teucrium corymbosum R. Br.—Mt. Stradbroke & Suggan Buggan, Upper Snowy & Little Rivers, Cann River district, Murrungowar
Ajuga australis R. Br.

SOLANACEAE

Solanum aviculare Forst. f.
S. laciniatum Ait.—Genoa R. gorge
S. vescum F. Muell.—Lake King (near mouth of Tambo R.)
S. simile F. Muell.—Blackfellows' Ck (near Gelantipy), Suggan Buggan, Wulmerang district (between Little R. falls & Mt. Wheeler), Amboyne Ck, Mt. Tingaringy (chiefly in rain-shadow belt)
†*S. violaceum* R. Br.—Mt. Drummer (?extinct)
S. prinophyllum Dunal
S. pungetium R. Br.—Mitchell R. gorges, Sperm Whale Head, Marlo, Brodribb R., Bemm R. & Combienbar R., near Cape Howe
Nicotiana suaveolens Lehm.—Buchan, Suggan Buggan, Upper Snowy & Deddick Rivers (chiefly in rain-shadow belt)
Anthocercis frondosa (Miers) J. M. Black—Wentworth R.
A. albicans A. Cunn.—Mt. Stradbroke & Suggan Buggan, Snowy R. gorge (rain-shadow belt)

SCROPHULARIACEAE

Mimulus repens R. Br.—Sperm Whale Head, Bairnsdale & Lakes Entrance (saline coastal swamps)
Mazus pumilio R. Br.—(damp flats)
Gratiola peruviana L.
G. pedunculata R. Br.—Tambo R.
G. nana Benth.—Rocky Plain N. of Wombargo Ra.
Glossostigma elatinoides (Benth.) Benth. ex Hook. f.—Suggan Buggan
Limosella australis R. Br.—(permanently wet places)
Veronica perfoliata R. Br.—(stony slopes from Nunniong Plateau eastward to Delegate R.)
V. derwentia Andr.—(montane to subalpine)
V. gracilis R. Br.—(chiefly subalpine)
V. calycina R. Br.
V. plebeia R. Br.—Sperm Whale Head, Mitchell R. gorges, Lakes Entrance, Tambo R., Lind Nat. Park
V. notabilis F. Muell. ex Benth.—(chiefly shaded montane forest)
V. serpyllifolia L.—Ingeegoodbee district (against N.S.W. border)
Euphrasia collina R. Br.—Suggan Buggan & Wulgulmerang, Cann R. to Genoa, Mallacoota, Howe Ra.
E. glacialis Wettst.—Cobberas (alpine)
E. scabra R. Br.—Cobberas (alpine)

BIGNONIACEAE

Pandorea pandorana (Andr.) Steenis

GESNERIACEAE

Fieldia australis A. Cunn.—(tree-fern gullies eastward from Snowy R.)

LENTIBULARIACEAE (aquatic or on mud)

Utricularia dichotoma Labill.—Cobberas, Bruthen-Buchan road, Genoa R. gorge, Maramingo Ck
U. lateriflora R. Br.—Marlo plains, Reedy Ck near Cann R., Mallacoota
U. aurea Lour.—Wulgulmerang & Genoa districts

MYOPORACEAE

Myoporum insulare R. Br.—(coast-line from Sperm Whale Head to Mallacoota)
M. viscosum R. Br.—Lakes Entrance
M. floribundum A. Cunn. ex Benth.—Suggan Buggan R., Upper Snowy R. (above gorge tract) & Deddick R. (rain-shadow belt)

PLANTAGINACEAE

Plantago varia R. Br.
P. debilis R. Br.—Mitchell R. gorges, Wulgulmerang, Orbost, Mt. Drummer, Wingan Inlet.
P. tasmanica Hook. f.—Cobberas, Wulgulmerang (alpine & subalpine)

RUBIACEAE

†*Morinda jasminoides* A. Cunn. ex Hook.
Coprosma quadrifida (Labill.) Robinson
C. hirtella Labill.
C. nivalis W. R. B. Oliver—Nunniong Plateau, Wombargo Ra., Cobberas (alpine)
Nertera reptans (F. Muell.) Benth.—Wulgulmerang, Bendoc, sources of Brodribb R., Bemm R., Errinundra R. & Combienbar R. (montane)
Opercularia aspera J. Gaertn.—mouths of Snowy & Genoa Rivers, Lower Tonghi falls, Marlo, Wingan Inlet
O. hispida Spreng.—Mt. Raymond near Orbost, Wingan Inlet, Cann R., Snowy R. gorge, Genoa R. gorge, Genoa Peak, Howe Ra.
O. varia Hook. f.
O. ovata Hook. f.—Upper Genoa R., Mallacoota
Pomax umbellata Soland. ex J. Gaertn.
Asperula ambleia Shaw & Turrill—Bete Bolong (lower Snowy R.)

A. scoparia Hook. f.—(montane to subalpine areas eastward from Tambo R.)
A. conferta Hook. f.—(chiefly open grasslands)
A. gunnii Hook. f.—Cobberas, Mt. Tingaringy, Upper Delegate R. at Bidwell (alpine & subalpine)
A. pusilla Hook. f.—Cobberas & Mt. Tingaringy (alpine)
A. euryphylla Shaw & Turril—Suggan Buggan
Galium binifolium N. A. Wakefield—mouth of Snowy R., Mt. Drummer, Betka R. near Mallacoota
G. liratum N. A. Wakefield—Boggy Ck (at Nowa Nowa), Wulgulmerang & Suggan Buggan districts, Mt. Ellery, Upper Combienbar, Upper Genoa R.
G. australe DC.—Sperm Whale Head
G. gaudichaudii DC.
G. propinquum A. Cunn.—Mitchell R. gorges, Sperm Whale Head, Lakes Entrance, Suggan Buggan

CAPRIFOLIACEAE

Sambucus gaudichaudiana DC.
S. australasica (Lindl.) Fritsch—Orbost district (lower Snowy & Brodribb Rivers, Cabbage Tree Ck etc.—?extinct)

CUCURBITACEAE

Sicyos angulata L.—Tambo R., Buchan R., Orbost, Cann R. & Noorinbee North, Cape Howe.

CAMPANULACEAE

Wahlenbergia communis R. C. Carolin—Wulgulmerang district & Upper Snowy R. (at McKillop's Bridge)
W. stricta Swect
W. ceracea T. R. N. Lothian—Nunniong Plateau, Cobberas, Upper Delegate R. (alps & subalps)
W. gloriosa T. R. N. Lothian—Nunniong Plateau, Cobberas (alpine)
W. gymnoclada T. R. N. Lothian—Prince's Highway 13 miles E. of Orbost, Bemm R., Cann R., Mallacoota
W. tadgellii T. R. N. Lothian—Sperm Whale Head, Bairnsdale, Wulgulmerang, Mallacoota
W. quadrifida (R. Br.) A. DC.
W. densifolia T. R. N. Lothian—Nunniong Plain on Nunniong Plateau (subalpine)
W. gracilenta T. R. N. Lothian—Sperm Whale Head, Mt. Stradbroke near Wulgulmerang.

LOBELIACEAE

Lobelia gibbosa Labill.
L. pratioides Benth.
L. alata Labill.—(chiefly coastal)
Pratia purpurascens (R. Br.) F. E. Wimmer—Orbost district, Genoa R. gorge, Mallacoota
P. puberula Benth.—(subalpine tablelands between sources of Buchan & Bemm Rivers)
P. surrepens (Hook. f.) F. E. Wimmer—Cobberas, Wulgulmerang, Upper Delegate R. at Bidwell (alps & subalps)
P. platycalyx (F. Muell.) Benth.—Sperm Whale Head (salt-marsh)
Isotoma axillaris Lindl.—(exposed rocky slopes)
I. fluviatilis (R. Br.) F. Mucll. ex Benth.—Mitchell R. gorges, Wombargo Ra., Deddick R., Cann R., Upper Genoa R.

GOODENIACEAE

Velleia paradoxa R. Br.—Wulgulmerang & Suggan Buggan areas, Deddick R. & Amboync Ck near Tubbut, Bendoc
V. montana Hook. f.—Nunniong Plateau, Cobberas, Ingeegoodbee, Wulgulmerang, Upper Delegate R. at Bidwell, Bendoc (alps & subalps)
Goodenia stelligera R. Br.—Cann R., Thurra R., Wingan R., Genoa Ck
G. ovata Sm.
G. grandiflora Sims—Upper Snowy R. near Mt. Wheeler & at confluence with Suggan Buggan R., Deddick R. (rain-shadow belt)
G. hederacea Sm.—Cobberas, Mts. Stradbroke & Seldom Seen (Wulgulmerang district), Mt. Tingaringy (alpine & subalpinc)
G. elongata Labill.—Bruthen, Orbost district, Combienbar R., Cann R. valley, Thurra R.
G. pinnatifida Schlechtendal—Suggan Buggan (rain-shadow belt)
G. paniculata Sm.—Sperm Whale Head, Bairnsdale, Bruthen district, Marlo
G. humilis R. Br.—Bairnsdale, Bruthen, Orbost & Marlo, Cann R., Mallacoota
Coopernookia barbata (R. Br.) R. C. Carolin—W Tree Ck falls (N. of Buchan), Mt. Kaye, Kowat (NE. of Cann River), Genoa district, Howe Ra.
Selliera radicans Cav.—(saline flats along coast)
Scaevola ramosissima (Sm.) Krause—(eastward from Tambo R., & chiefly near-coastal)
S. hookeri (de Vriese) F. Muell. ex Hook. f.—Marlo & Cape Conran
S. aemula R. Br.—Butcher's Ck near W Tree, lower Cann R., Little Ram Head, Genoa R.
S. calendulacea (Andr.) Druce—near

Bairnsdale, Lakes Entrance, Mallacoota Inlet, Gabo Is. (coastal)
S. pallida R. Br.—Bairnsdale, Lake Tyers, Orbost, Cape Howe (coastal)
Dampiera stricta (Sm.) R. Br.
D. purpurea R. Br.—Mt. Seldom Seen near Wulgulmerang, Ballantyne Hills above Suggan Buggan, Snowy R. gorge near W Tree

BRUNONIACEAE

Brunonia australis Sm. ex R. Br.—Mt. Taylor near Bairnsdale, Wairewa (6 miles ENE. of Nowa Nowa), Orbost district, sources of Brodribb R., Cann R.

STYLIDIACEAE

Stylidium graminifolium Swartz
S. lineare Swartz—Rocky Plain N. of Wombargo Ra. (subalpine)
S. laricifolium L. C. Rich.—Wingan Inlet
S. despectum R. Br.—Cann River

COMPOSITAE

Olearia viscosa (Labill.) Benth.—Lake King & Lakes Entrance (coastal)
O. megalophylla (F. Muell.) Benth.—Nunniong Plateau, Cobberas, Wombargo Ra., Ingeegoodbee, Wulgulmerang, Mt. Tingaringy (subalpine)
O. alpicola (F. Muell.) Benth.—Cobberas, Wombargo Ra., Snowy R. gorge, Upper Delegate R. at Bidwell, Bendoc, Mt. Ellery (chiefly subalpine)
O. dentata (Andr.) Moench—Howe Ra. (Harrison's Gully etc.)
O. argophylla (Labill.) Benth.—(chiefly in humid forests)
O. myrsinoides (Labill.) Benth.
O. erubescens (DC.) Dippel—(montane)
O. asterotricha (F. Muell.) Benth.—Brodribb R. & Newton's Ck, Mallacoota
O. lirata (Sims) Hutch.
O. phlogopappa (Labill.) DC.—(chiefly montane to subalpine)
O. rugosa (F. Muell. ex Archer) Hutch.—Orbost district (incl. Mt. Buck), sources of Bemm R.
O. iodochroa (F. Muell.) Benth.—(stony hills from Tambo R. to Mt. Tingaringy)
O. axillaris (DC.) Benth.—Lakes Entrance, Mallacoota (coastal dunes)
O. *floribunda* (Hook. f.) Benth.—Cobberas, Ingeegoodbee, Bendoc (subalpine)
O. algida N. A. Wakefield—Upper Delegate R. at Bidwell (subalpine)
O. ramulosa (Labill.) Benth.—(lowland areas)
O. glandulosa (Labill.) Benth.—(swampy tracts between Mitchell & Cann Rivers, chiefly montane)
O. glutinosa (Lindl.) Benth.—Sperm Whale Head, mouth of Mueller R., Mallacoota (coastal)
Celmisia longifolia Cass.—Nunniong Plateau, Cobberas (alpine)
Vittadinia triloba (Gaudich.) DC.—Sperm Whale Head, Mitchell R. gorges, Bairnsdale, Wulgulmerang & Suggan Buggan, Reedy R., Deddick, Tubbut, Bendoc, Orbost
Erigeron pappochroma Labill.—Nunniong Plateau, Cobberas (alpine)
Lagenophora stipitata (Labill.) Druce
L. gracilis Steetz—Mallacoota Inlet
Solenogyne bellioides Cass.—Wulgulmerang district & Suggan Buggan, Snowy R., Genoa district
Calotis lappulacea Benth.—Glenaladale & Tabberabbera, Mitchell R. gorges, Suggan Buggan, Upper Snowy R., Deddick R. (chiefly in rain-shadow belts), Newmerella & Orbost districts
C. scabiosifolia Sond. & F. Muell.—Cobberas, Wulgulmerang, Upper Snowy R., Delegate R. (chiefly subalpine)
Brachycome decipiens Hook. f.—Nunniong Plateau, Wulgulmerang & Gelantipy, Bendoc, Upper Genoa R. (subalpine tablelands)
B. scapigera (Sieber ex Spreng.) DC.—Nunniong Plateau, Cobberas, Suggan Buggan, Wulgulmerang & Gelantipy districts (alps & subalps)
B. obovata G. L. Davis—Cobberas (alpine)
B. cardiocarpa F. Muell. ex Benth.—Bruthen, Orbost (wet flats)
B. nivalis F. Muell.—Nunniong Plateau, Cobberas (alpine)
B. graminea (Labill.) F. Muell.—(saline coastal flats from Sperm Whale Head to Mallacoota)
B. parvula Hook. f.—Sperm Whale Head, Lakes Entrance (coastal)
B. radicans Steetz—Nunniong Plain on Nunniong Plateau (subalpine)
B. angustifolia A. Cunn. ex DC.—Sperm Whale Head, Orbost district, Cann R. to Mt. Drummer, Karlo Ck, Upper Genoa R., Howe Ra. (near-coastal)
B. multifida DC.—Sperm Whale Head, Mitchell R. gorges, Suggan Buggan, Orbost, Marlo
B. petrophila G. L. Davis—Murrindal R. (near Buchan), Little R. & Boundary Ck (near Wulgulmerang), on cliff-faces
B. diversifolia (R. Graham ex Hook.) Fisch. & C. Mey.—Sperm Whale Head, Timbarra R. near Gillingall, Snowy R.

B. ciliaris (Labill.) Less.—Suggan Buggan (rain-shadow belt)
B. rigidula (DC.) G. L. Davis—Swift's Creek, Cobberas, Suggan Buggan Ra., Monument Ridge at N.S.W. border (above Amboyne Ck), Mt. Tingaringy
B. riparia G. L. Davis—Snowy R. gorge, Genoa R. (gorge tract & upper reaches)
B. aculeata (Labill.) Less.
B. scapiformis DC.—(montane to alpine)
Glossogyne tenuifolia Cass.—Suggan Buggan (rain-shadow belt)
Sigesbeckia orientalis L.
Bidens tripartita L.—Mitchell R. & Bairnsdale, Swift's Creek, Snowy R.
Stuartina muelleri Sond.—Sperm Whale Head, Suggan Buggan, Deddick R.
Gnaphalium purpureum L.
G. involucratum Forst. f.
G. japonicum Thunb.—(chiefly montane)
G. umbricola J. H. Willis—Cobberas, Wombargo Ra., Wulgulmerang, Mt. Tingaringy (subalpine)
G. traversii Hook f.—Snowy R. (? N.S.W.)
G. indutum Hook. f.—Sperm Whale Head
G. luteo-album L.
Ewartia nubigena (F. Muell.) Beauverd—Cobberas (alpine)
Cassinia longifolia R. Br.
C. trinerva N. A. Wakefield—Mt. Ellery
C. aculeata (Labill.) R. Br.
C. uncata A. Cunn. ex DC.—Lake King & Bairnsdale, Lakes Entrance, Snowy R., Tamboon Inlet
Apalochlamys spectabilis (Labill.) J. H. Willis—Sperm Whale Head, Lake King, Lakes Entrance, Cape Everard, Mallacoota, Gabo Is. (coastal)
Helipterum anthemoides (Sieber ex Spreng.) DC.—Nunniong Plateau, Cobberas (playground area), Wulgulmerang & Gelantipy (subalpine)
H. albicans (A. Cunn.) DC.—Reedy R. gorge (against Nunniong Plateau), Wulgulmerang & Suggan Buggan, Ingeegoodbee (subalpine)
H. australe (A. Gray) Druce—Suggan Buggan, Upper Snowy R. & Deddick R. (rain-shadow belt)
Helichrysum baxteri A. Cunn. ex DC.—Orbost to Bell-bird & Ti-tree Cks, Cann R., Thurra R., Genoa R. (gorge & upper tracts), Howe Ra., Timbarra R.
H. apiculatum (Labill.) DC.—Sperm Whale Head, Bairnsdale, Suggan Buggan & Wulgulmerang, Bendoc, Gabo Is.
H. semipapposum (Labill.) DC.
H. scorpioides Labill.
H. rutidolepis DC.—(subalpine tablelands from Cobberas to Goonmirk Ra.)
H. dealbatum Labill.—Bruthen
H. acuminatum DC.—Nunniong Plateau, Cobberas, Wombargo Ra., Mt. Stradbroke near Wulgulmerang, Bonang (alps & subalps)
H. bracteatum (Vent.) Andr.
H. elatum A. Cunn. ex DC.—Orbost district, Ram Head & Wingan Inlet, Howe Ra. (mostly coastal)
H. leucopsidium DC.
H. adnatum (DC.) Benth.—Suggan Buggan & Upper Snowy R. (rain-shadow belt)
H. alpinum N. A. Wakefield—Mt. Kaye (subalpine)
H. paralium (N. T. Burbidge) W. M. Curtis—Sperm Whale Head, Bairnsdale, Lakes Entrance, Wingan Inlet, Mallacoota (coastal)
H. rogersianum J. H. Willis—Nunniong Plateau (Little Reedy R. near Brumby Point)
H. rosmarinifolium (Labill.) Benth.—(montane to subalpine)
H. thyrsoideum (DC.) P. F. Morris & J. H. Willis—(subalpine forests)
H. secundiflorum N. A. Wakefield—Cobberas, Wombargo Ra., Mt. Ellery (alps & subalps)
H. dendroideum N. A. Wakefield
H. conditum N. A. Wakefield—Wulgulmerang & Suggan Buggan, Upper Snowy R., Amboyne Ck, Upper Genoa R.
H. argophyllum (A. Cunn. ex DC.) N. A. Wakefield—Wulgulmerang, Sarsfield, Ram Head & Wingan Inlet, Upper Genoa R. (chiefly coastal)
H. cuneifolium F. Muell. ex Benth.
H. stirlingii F. Muell.—Ingeegoodbee R. near Cobberas
H. obcordatum (DC.) Benth.
H. hookeri, Sond.) Druce—Cobberas (alpine)
Leptorhynchos linearis Less.—Snowy R., Wombat Ck, Cann R., Howe Ra.
L. elongatus DC.—Wulgulmerang, Orbost.
L. tenuifolius F. Muell.—Bairnsdale (grassland)
L. squamatus (Labill.) Less.—Bairnsdale, Cobberas, Wulgulmerang & Suggan Buggan, Bendoc (principally subalpine herbfields)
Rutidosis multiflora (Nees) B. L. Robinson—Sperm Whale Head
Calomeria amaranthoides Vent.—Tambo R. & Monkey Ck near Bruthen, Orbost district, Bemm & Combienbar Rivers, Lind Nat. Park, Mueller R., Genoa R.
Haeckeria ozothamnoides (F. Muell.) F. Muell.—Snowy R. (?extinct)

Podolepis jaceoides (Sims) Voss—Wulgulmerang, Bonang & Bendoc districts
P. robusta (Maiden & Betche)J. H. Willis —Cobberas, Native Dog Ck (alpine)
P. hieracioides F. Mucll.—Wombargo Ra., Suggan Buggan Ra., Gelantipy, Goongerah (subalpine)
Angianthus preissianus (Steetz) Benth.—Sperm Whale Head (in salt-marsh)
Calocephalus brownii (Cass.) F. Muell.—Lake King, Lakes Entrance, Cape Conran, Wingan Inlet (coastal)
C. lacteus Less.—Sperm Whale Head (swamp-margins)
Craspedia glauca (Labill.) Spreng.
Cotula coronopifolia L.—Sperm Whale Head, Paynesville & Bairnsdale, Wingan Inlet, Gabo Is. (swampy subsaline coastal tracts)
C. australis (Sieber ex Spreng.) Hook. f. —Sperm Whale Head, Lakes Entrance, Suggan Buggan, Dellicknora Ck (etc.)
C. alpina (Hook. f.) Hook. f.—Gelantipy & Wulgulmerang, Mt. Stradbroke, Wombargo Ra., Cobberas (alps & subalps)
C. reptans (Benth.) Benth.—Sperm Whale Head, Lake Tyers, Ram Head & Wingan Inlet, Cape Conran, Mallacoota, Gabo Is. (chiefly coastal)
C. filicula (Hook. f.) Benth.—subalpine tablelands from Nunniong Plateau to Mt. Ellery & Goonmirk Ra.
Centipeda minima (L.) A. Br. & Aschers. —Wulgulmerang, Lower Bendoc, Cann R., Upper Genoa R.
C. cunninghamii (DC). A. Br. & Aschers. —Mitchell R. gorges, Suggan Buggan, Cann R., Snowy R. gorge
Isoëtopsis graminifolia Turcz.—Suggan Buggan (rain-shadow belt)
Senecio pectinatus DC.—Cobberas (alpine)
S. orarius J. M. Black—Tamboon Inlet (coastal)
S. spathulatus A. Rich.—near Bairnsdale, Lakes Entrance, Marlo, Tamboon Inlet, Mallacoota (coastal sand-hummocks)
S. lautus Forst. f. ex Willd. (sens. lat.)
S. velleioides A. Cunn. ex DC.—(humid forests)
S. vagus F. Muell.—Upper Buchan R., Little R. gorge near Wulgulmerang, Bonang, Brodribb R., Combienbar
S. linearifolius A. Rich.
S. odoratus Hornem.—Sperm Whale Head (coastal)
S. minimus Poir.—(chiefly forestal)
S. biserratus R. O. Belcher—Sperm Whale Head (near-coastal)
S. quadridentatus Labill.
S. gunnii (Hook. f.) R. O. Belcher—Wombargo Ra., Mt. Tingaringy (alps & subalps)
S. glomeratus Desf. ex Poir.
S. hispidulus A. Rich.—Suggan Buggan, Upper Snowy R., Lind Nat. Park, Upper Genoa R., Genoa Peak, Gabo Is.
S. squarrosus A. Rich.—Amboyne Ck near Tubbut, Cape Howe
Arrhenechthites mixta (A. Rich.) R. O. Belcher—sources of Bemm & Delegate Rivers, Bidwell, Mt. Kaye, Genoa Peak, Howe Ra.
Bedfordia salicina (Labill.) DC.—(humid forests)
Cymbonotus preissianus Steetz
C. lawsonianus Gaudich.—Buchan Caves
Microseris scapigera (Forst.) Schult. Bip. —(more open, grassy tracts)
Sonchus megalocarpus (Hook. f.) J. M. Black—Lakes Entrance (coastal dunes)

6

Amphibia of East Gippsland

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Abstract

Nineteen taxa (17 species and two subspecies) of anuran amphibians are recorded from E. Gippsland. The fauna is considered to be predominantly Bassian with cool and warm temperate forms being about equally represented. Distributional data, field observations and general references are provided for each taxon.

Introduction

Moore (1961) and Littlejohn (1967) have discussed the zoogeography of S.E. Australian amphibians in general terms, but the aim of this present paper is to provide a more detailed account, consistent with that of Littlejohn and Martin (1965) for the Bass Strait islands and Littlejohn (1966) for the Victorian Mallee. For present purposes E. Gippsland is defined as that area of Victoria E. of the 148th meridian, and S. of the Continental Divide from that meridian to the border of Victoria and New South Wales.

As indicated by Rawlinson (1966, 1967, and this volume), E. Gippsland falls within the Bassian zoogeographic sub-region and its reptile fauna is largely Bassian. Thus, when examining the amphibians of this area, one may ask whether this fauna is also of a largely Bassian nature.

All specimens examined are contained in the Research Collection, Department of Zoology, University of Melbourne. Mating calls are, in most cases, excellent indicators of species identity and data on these were obtained from road logs of breeding choruses. Only localities additional to those where specimens were obtained are listed in the voice records for each taxon. Where specimens or voice records were obtained from two or more localities within 5 miles radius of a town they have generally been included under the one locality and the term 'area' added. Only specimens and field observations from within the defined area are listed, but literature references apply to a taxon in general. It should be noted that data on calling seasons may be incomplete as no field trips were made into the area in June, July, September and October.

Hylidae

Hyla aurea (Lesson)

Specimens: Goongerrah; 11 miles E. of Orbost; Nowa Nowa.

Voice Records: 8 miles E. of Bendoc; Fairhaven, Mallacoota Inlet; 1 mile N. of Marlo.

Literature Records: Genoa, Gipsy Point, Orbost, Nowa Nowa, 6 miles N. of Lakes Entrance, Corringle Beach (Littlejohn, Martin and Rawlinson 1963).

Remarks: This species has been heard calling in December and January while floating in open water in dams and swamps. The specimens may be assigned to the subspecies *H. aurea aurea* with the exception of a series from Orbost in which there are indications of *raniformis* characteristics. The situation can be clarified

only by further field investigations and analysis. A general account of the complex has been given by Moore (1961) and geographic distribution figured by Littlejohn (1967).

Hyla ewingi Duméril and Bibron

SPECIMENS: 6 miles SW. of Bendoc; 5 miles SW. of Goongerrah; 2 miles NE. of Sardine Creek; 7 and 8 miles SW. of Buchan; Genoa; 2 miles N. of Cann River; 6 miles NW. of Orbost; 6 miles N. of Nowa Nowa; Nowa Nowa area; 2 miles N. of Mallacoota; Bemm River.

VOICE RECORDS: Sardine Creek; 12 miles N. of Cann River; 15 miles NE. of Orbost; 10 and 12 miles E. of Orbost; Bellbird Creek; Cabbage Tree; 12 miles W. of Orbost.

LITERATURE RECORDS: These are not cited since in most earlier works no clear distinction was made between *H. ewingi* and *H. verreauxi*.

REMARKS: Calls of this species have been heard in February, August, November and December. Males call from emergent or marginal vegetation, at the edges of temporary or permanent ponds, or while floating and supported by emergent vegetation. General references to this species are given by Littlejohn (1966). Martin (1967a) has discussed some aspects of larval ecology.

Hyla jervisiensis Duméril and Bibron

SPECIMENS: The Gap, 6 miles SSE. of Bonang.

VOICE RECORDS: None.

LITERATURE RECORDS: Club Terrace By-pass about 12 miles W. of Cann River, Bellbird Creek (Littlejohn, Martin and Rawlinson 1963); 12 miles W. of Cann River, 15 miles N. of Orbost (Martin and Littlejohn 1966).

REMARKS: A general account of the morphology, breeding biology, development and distribution of this species is given by Martin and Littlejohn (1966).

Hyla lesueuri Duméril and Bibron

SPECIMENS: Willis; Suggan Buggan; Little River Bridge and McKillop's Bridge on the Wulgulmerang to Bonang Road; Goongerrah; Weeragua area; 3 miles N. of Sardine Creek; Genoa area.

VOICE RECORD: 6 miles SW. of Goongerrah.

LITERATURE RECORDS: Honeysuckle Track near Gelantipy (Brazenor 1947); 22 miles N. of Cann River (Copland 1957).

REMARKS: The soft, trilled mating calls of this species have been heard in November and December. Males call from banks and boulders along shallow, rocky streams. General accounts of this species are provided by Moore (1961) and Martin, Littlejohn and Rawlinson (1966). Larval adaptation and ecology are briefly discussed by Martin (1967a).

Hyla peroni (Tschudi)

SPECIMENS: Fairhaven on Mallacoota Inlet.

VOICE RECORDS: Nowa Nowa area; 3 miles E. of Brodribb River; 3 miles E. of Lakes Entrance; 6 miles NE. of Lakes Entrance.

LITERATURE RECORDS: Genoa, Gipsy Point, Orbost, 8 miles E. of Lakes Entrance, Marlo (Littlejohn, Martin and Rawlinson 1963).

REMARKS: This species has been heard calling from early November to mid-January. Males usually call from elevated positions in the marginal and emergent vegetation of fairly permanent ponds and swamps. The call may be described as a

loud, chuckling trill. Moore (1961) has given a general account of this species, and Littlejohn (1967) has briefly discussed its geographical distribution.

Hyla phyllochroa Günther

SPECIMENS: 7 and 9 miles N. of Chandlers Creek; 1 mile N. of Goongerrah; 5 miles SW. of Sardine Creek; 10 miles ENE. of Bellbird Creek; Brodribb River.

VOICE RECORDS: 2 miles NE. of Bonang; 6 miles SW. of Goongerrah; 16 miles E. of Cann River.

LITERATURE RECORDS: 17 miles N. of Cann River, 26 miles N. of Orbost, Genoa, Cabbage Tree Creek (Littlejohn, Martin and Rawlinson 1963).

REMARKS: *Hyla phyllochroa* has been heard calling from November to March along the banks of small streams. The E. Gippsland populations belong to Form A of Littlejohn (1967) which is characterized by having a mating call consisting of one or two long introductory notes followed by a series of shorter notes. Moore (1961) has reviewed the available information on this species, and Copland (1962) recorded it from Victoria for the first time.

Hyla verreauxi Duméril

SPECIMENS: Between the Cobberas; 8 miles SE. of Limestone Creek on the Black Mountain Track; 1 mile N. of Native Dog Plain (about 3 miles SW. of Mt. Cobberas); top of Little River Gorge; Wulgulmerang; 3 miles N. of Gelantipy; 6 miles SW. of Bendoc; 10 miles NE. of Genoa; Genoa; 8 miles SSW. of Buchan; 2 miles N. of Cann River.

VOICE RECORDS: Bonang; 5 miles N. of Chandlers Creek; Goongerrah; 7 miles E. of Cann River; 11 miles WSW. of Genoa; Nowa Nowa; 12 miles WSW. of Orbost; 11 miles E. of Orbost.

LITERATURE RECORDS: These cannot be used since in most earlier works no distinction was made between *H. verreauxi* and *H. ewingi*.

REMARKS: This species has been heard calling in August and from November to February at the borders of temporary pools, swamps and dams. Litlejohn (1963, 1965) has described adult morphology, distribution and mating call structure of this species. Martin (1965) has commented on the similarity of the larvae of *H. verreauxi* and *H. ewingi*. The specimens from the Mt. Cobberas area may be assigned to the subspecies *H. verreauxi alpina* Fry (see comment by Littlejohn, 1967, p. 155).

LEPTODACTYLIDAE

Crinia haswelli Fletcher

SPECIMENS: Genoa; 15 miles NE. of Orbost; 3 miles SW. of Nowa Nowa.

VOICE RECORDS: Stony Creek, 6 miles NW. of Nowa Nowa; 11 miles E. of Orbost; 12 miles WSW. of Orbost; 6 miles NW. of Bemm River.

LITERATURE RECORDS: 5 miles E. of Cann River (Moore 1961); 8 miles NE. of Genoa, 8 miles E. of Genoa, 2 miles NW. of Mallacoota, Cann River, 8 miles S. of Buchan, 6 miles N. of Nowa Nowa, Cabbage Tree, Bemm River, Corringle Beach, Marlo (Littlejohn, Martin and Rawlinson 1963).

REMARKS: The mating call of this species may be described as a short, bell-like 'ank'. Males have been heard calling in August and from November to March from the banks of, or while floating in, temporary or permanent ponds, dams and swamps. Two mated pairs (inguinal amplexus) were seen floating in a small pond during early March. Moore (1961) has given a general account of this species and Martin (1967b) has briefly described and figured the larva.

Crinia signifera Girard

SPECIMENS: 30 miles E. of Benambra on Mt. Cobberas track; Mt. Cobberas; Nunyong Tableland; Wulgulmerang; 1 mile N. of Goongerrah; Weeragua area; 8 miles NW. of Genoa; 8 miles NE. of Genoa; Buchan area; 7 and 8 miles SSW. of Buchan; 12 miles W. of Cann River; 4 miles N. of Nowa Nowa; 2 miles S. of Cabbage Tree; Bemm River.

VOICE RECORDS: 6 and 8 miles E. of Bendoc; Bonang area; 10 miles N. of Chandlers Creek; Goongerrah area; Chandlers Creek area; Sardine Creek; Genoa area; Gipsy Point; Mallacoota area; 15 miles NE. of Orbost; 2 miles N. of Cann River; 6 miles N. of Nowa Nowa; 12 miles E. of Bruthen; Nowa Nowa area; Orbost area; 12 miles E. of Orbost; 12 miles WSW. of Orbost; Cabbage Tree area; 2 miles W. of Bellbird Creek; 6 miles NW. of Bemm River; Corringle Beach; Marlo; Lakes Entrance area.

LITERATURE RECORDS: Little River between Buchan and New South Wales border (Brazenor 1947); Youngs Creek, 9 miles N. of Orbost (Moore 1961).

REMARKS: This common species has been heard calling from November to March and in May and August. Most lentic sites (temporary and permanent) are utilized for breeding and males usually call from sheltered positions at the edges of the breeding sites. Litlejohn (1966) has listed recent references to this species. Martin (1967b) refers to some aspects of larval ecology.

Crinia victoriana Boulenger

SPECIMENS: 6 miles SW. of Bendoc; 1 mile N. of Goongerrah; Genoa.

VOICE RECORDS: 6 miles S. of Bonang; 4 miles N. of Goongerrah; Cann River area; 7 miles E. of Cann River; 14 miles E. of Orbost.

LITERATURE RECORDS: Bonang, 3 miles S. of Bonang, Gelantipy, 13 miles N. of Buchan, 3 miles S. of Buchan, Cann River, 12 miles N. of Nowa Nowa, 6 miles N. of Nowa Nowa, Cabbage Tree Creek (Littlejohn and Martin 1964).

REMARKS: Mating calls of *Crinia victoriana* have been heard in February and March. Littlejohn and Martin (1964) provide a detailed account of the general biology, morphology and distribution of this species.

Helcioporus australiacus Shaw

SPECIMENS: None.

VOICE RECORDS: None.

LITERATURE RECORD: 200 and 300 yards S. of the Victoria-New South Wales border (about 29 miles N. of Cann River) (Littlejohn and Martin 1967).

REMARKS: The available information on this striking, but rather secretive, species has been summarized by Littlejohn and Martin (1967).

Limnodynastes dorsalis (Gray)

SPECIMENS: Nunyong Tableland, 28 miles NE. of Ensay; 10 miles NE. of Genoa; Fairhaven, Mallacoota Inlet; 6 miles S. of Buchan; Cann River area; 15 miles NE. of Orbost; 6 miles N. of Nowa Nowa; 6 miles NW. of Orbost; Nowa Nowa; Orbost; 10 and 11 miles E. of Orbost; Bemm River area; 6 miles N. of Lakes Entrance; 5 miles E. of Lakes Entrance.

VOICE RECORDS: 6 and 8 miles E. of Bendoc; Bonang area; Goongerrah; 6 miles N. of Chandlers Creek; 3 miles S. of Buchan; 1 mile S. of Genoa; Gipsy Point; Mallacoota area; Bete Bolong; 12 miles WSW. of Orbost; Corringle Beach area; 4 miles NE. of Lakes Entrance; 6 miles E. of Lakes Entrance.

LITERATURE RECORDS: Little River (Brazenor 1947); 5 miles E. of Cann River (Moore 1961).

REMARKS: This species has been heard calling in August and from November to March. Numerous egg masses were seen in early March, 1961, following very heavy rains. Males usually call while floating, concealed by overhanging and emergent vegetation, and a wide range of temporary and permanent still water habitats is utilized for breeding. The material may be assigned to the subspecies *insularis* Parker with the exception of the specimen from the Nunyong Tableland which is of the subspecies *dumerili* Peters (A. A. Martin, pers. comm.). Littlejohn (1966) has provided general references to the species and geographic distributions of the subspecies is figured by Littlejohn (1967). Martin (1967a) has discussed oviposition patterns within the *L. dorsalis* complex.

Limnodynastes peroni (Duméril and Bibron)

SPECIMENS: 10 miles N. of Chandlers Creek; 7 miles S. of Gelantipy; Goongerrah; 7 miles S. of Buchan; Club Terrace By-pass; 2 miles N. of Cann River; Nowa Nowa; Bemm River; 6 miles N. of Lakes Entrance.

VOICE RECORDS: 6 and 8 miles E. of Bendoc; Bonang; 10 miles N. of Chandlers Creek; Chandlers Creek area; 6 miles SW. of Goongerrah; 10 miles NE. of Genoa; 3 and 4 miles E. of Genoa; Gipsy Point; 5 miles SW. of Sardine Creek; 15 and 16 miles NE. of Orbost; 12 miles E. of Bruthen; 3 miles E. of Brodribb River; Lakes Entrance area.

LITERATURE RECORDS: None.

REMARKS: Mating calls of this species have been heard from November to March. Males call from concealed sites while floating in fairly permanent still water. General accounts have been given by Moore (1961) and Littlejohn (1963). The larva has been described by Martin (1965) and some aspects of oviposition are discussed by Martin (1967a).

Limnodynastes tasmaniensis Günther

SPECIMENS: Wulgulmerang.

VOICE RECORDS: 6 and 8 miles E. of Bendoc; 1 mile S. of Bonang; Lakes Entrance area.

LITERATURE RECORDS: None.

REMARKS: Calls were heard in March, November and December and were all of the Southern Call Race (*sensu* Littlejohn, 1966). Males of this species call while floating in open positions in temporary and permanent still-water habitats. *L. tasmaniensis* appears to be restricted to the extreme northern and western borders of E. Gippsland (see distribution map in Littlejohn, 1967). Other recent references are given by Littlejohn (1966).

Mixophyes fasciolatus Günther

SPECIMENS: 10 miles N. of Chandlers Creek (just S. of the border between Victoria and New South Wales).

VOICE RECORDS: None.

LITERATURE RECORDS: None.

REMARKS: This species is recorded from Victoria for the first time. The specimens were collected on the evening of 6:XII:65 and were calling from the banks and boulders along a shallow rocky stream. The mating call is a short grating trill (Form B of Littlejohn, 1967). Moore (1961) has provided a general account of the species complex, and Martin (1967a) has described some aspects of larval morphology and ecology.

Pseudophryne dendyi Lucas

SPECIMENS: Mt. Cobberas area; Limestone Creek, 25 miles E. of Benambra; Willis; Nunyong Tableland, 28 miles NE. of Ensay; Wulgulmerang area; 6 miles SW. of Bendoc; 2 miles S. of Bonang; 8 miles S. of Gelantipy; 13 miles N. of Buchan; 1 mile N. of Weeragua; 12 miles N. of Cann River; 3 miles S. of Buchan; 7 and 8 miles S. of Buchan; 2 miles W. of Club Terrace; Cann River area; 10 miles W. of Genoa; 2 miles N. of Mallacoota.

VOICE RECORDS: Little River Bridge area, Wulgulmerang-Bonang Road.

LITERATURE RECORDS: Honeysuckle Track, near Gelantipy (Brazenor, 1947, as *P. bibroni*); Bonang and 15 miles N. of Orbost (Moore 1961).

REMARKS: This species has been heard calling from mid-February to late April. An amplexed pair was taken on 20:II:63 and eggs were seen on 16:IV:65. Males call from shallow burrows in low, swampy areas which will later flood with winter rains. Eggs are laid in these burrows and initial development is terrestrial. A general account of the species is given by Moore (1961) and a distribution map is figured by Littlejohn (1967). The mating call is similar to that of *P. semimarmorata* and may be described as a short, grating 'ark'.

Pseudophryne semimarmorata Lucas

SPECIMENS: Bete Bolong; 1 mile S. of Newmerella; 4 miles SW. of Nowa Nowa; 5 miles E. of Lakes Entrance; 1 mile N. of Corringle Beach; Marlo.

VOICE RECORDS: None.

LITERATURE RECORDS: None.

REMARKS: This species has similar breeding habits to those of *P. dendyi* and has been heard calling in March and May. Specimens from 1 and 6 miles N. of Nowa Nowa appear to be intermediate between *P. dendyi* and *P. semimarmorata* and indicative of limited hybridization. Littlejohn (1963) has given a brief general account of the species; Martin (1965; 1967a) has described and figured the larva. Littlejohn (1967) has presented a map of distribution and commented on the hybridization between the taxa.

Uperoleia marmorata Gray

SPECIMENS: 3 miles SW. of Nowa Nowa.

VOICE RECORD: 3 miles E. of Lakes Entrance.

LITERATURE RECORD: 2 miles N. of Cann River (Littlejohn, Martin and Rawlinson 1963).

REMARKS: Mating calls of this species were heard on 7:XII: 63 and the call may be described as a long, rasping 'squelch'. Males were calling from the litter at the edge of a small, fairly permanent pool. A general description of the species has been given by Moore (1961) who prefers to recognize only one species within the genus. On our present information it seems more reasonable to follow Parker (1940) and to recognize this entity as distinct from the *U. rugosa* (Andersson) complex which appears to contain at least two sibling species (Forms A and B of Littlejohn, 1967).

Discussion and Summary

Nineteen taxa (17 species and two subspecies) are known to occur in E. Gippsland (Table 1). Of these, 12 (or 63%) are probably restricted to the Bassian subregion (*sensu* Spencer 1896; see discussion by Littlejohn 1967, and Rawlinson, this volume), seven with typically southern (cool temperate) distributions and five with

TABLE 1

Zoogeographic Analysis of the Amphibian Fauna of E. Gippsland

Species	*Exclusive Bassian*		Eyrean	Uncertain
	Southern	Eastern		
HYLIDAE				
Hyla aurea		x		
H. ewingi	x			
H. jervisiensis		x		
H. lesueuri				x
H. peroni				x
H. phyllochroa				x
H. verreauxi verreauxi				x
H. v. alpina	x			
LEPTODACTYLIDAE				
Crinia haswelli		x		
C. signifera				x
C. victoriana	x			
Heleioporus australiacus		x		
Limnodynastes dorsalis dumerili			x	
L. d. insularis	x			
L. peroni				x
*L. tasmaniensis**	x			
*Mixophyes fasciolatus***		x		
Pseudophryne dendyi	x			
P. semimarmorata	x			
TOTAL	7	5	1	6

* Southern call race of Littlejohn (1966).

** Form B of Littlejohn (1967).

typically eastern (warm temperate) distributions (Table 1). Of the remainder, six are either wide-ranging through the Bassian and Torresian sub-regions, or their northern limits are not known, or they belong in sibling species complexes for which little field data are available. Accordingly, these are classed as of uncertain zoogeographic status for the present purposes (Table 1), although some may actually belong in the Eastern Bassian Component.

The last taxon to be considered, *Limnodynastes dorsalis dumerili*, ranges mainly through areas on the inland slopes of the Dividing Range and adjacent plains and may be considered as a marginal Eyrean form (i.e. typical of the Eyrean sub-region of Spencer 1896); it appears to penetrate into E. Gippsland by way of the Monaro Plains (see map in Littlejohn 1967). Two other marginal Eyrean taxa also occur in the southern Monaro area of New South Wales. We have records of *Neobatrachus pictus* Peters from 7 miles N. and 9 miles SW. of Bombala, and of *Uperoleia rugosa* (Form B of Littlejohn 1967, i.e. characterized by a long, unpulsed mating call) from two miles N. of Bombala, and from 4 miles NE. and 3 miles W. of Delegate. These two species may subsequently be found in the apparently suitable drier tract of E. Gippsland along the border between the Snowy and Cann Rivers.

In summary, we may conclude that the anuran amphibian fauna of E. Gippsland is composed largely of Bassian taxa with eastern warm temperate and southern cool temperate forms being about equally represented. Only one Eyrean

taxon has been found in the defined area, and with two others which occur close by in southern New South Wales may constitute an Eyrean or Monaro intrusive component. The balance of the fauna is made up of wide-ranging forms (Bassian and Torresian), or of taxa for which more field data are required.

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A. A. Martin read the manuscript.

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7

The Reptiles of East Gippsland

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Introduction

Gippsland is included in Spencer's (1896) Bassian zoogeographic subregion and its reptile fauna has been described as typically Bassian (Rawlinson 1966, 1967). However the data and principles on which this conclusion was based were not given in these earlier papers and the present account of the reptiles of East Gippsland provides an opportunity to correct the situation.

The Bassian subregion (*sensu* Serventy & Whittell 1951) lies within the temperate zone, and temperatures in the area are generally lower than those prevailing elsewhere in Australia. This factor is a most important one for reptiles, as internal thermoregulation is the only major physiological homeostatic capacity which they lack (Bartholomew 1958). Temperatures decrease with an increase in latitude and altitude; thus the coldest zones in the Bassian subregion are the more southerly areas and the mountain tops. For this reason, the Bassian subregion can be divided into three thermal zones, each of which appears to have a characteristic reptile fauna (Rawlinson unpublished):

1. Warm temperate zone: Coastal plains of E. New South Wales and E. Victoria; inland margins of the Eastern Highlands; and the coastal plains of SW. Victoria and SE. South Australia.

2. Cool temperate zone: Eastern Highlands in New South Wales and Victoria, including the Southern Uplands; N. and E. Tasmania.

3. Cold temperate zone: Alpine areas in E. Victoria and SE. New South Wales; highlands and S. and W. areas of Tasmania.

Gorge of the Little River
(*A. W. Howitt, 1876.*)

East Gippsland (defined as that area of Victoria E. of 148° longitude and S. of the New South Wales border) lies mainly in the warm temperate zone, but the cool temperate zone is represented in the Australian Alps and Coastal Ranges above 2000 ft. Thus distributional data for the reptiles of East Gippsland could reveal some species which are restricted to the lower elevations (warm temperate) and others which are restricted to the higher elevations (cool temperate).

The most extensive form of vegetation in East Gippsland is wet sclerophyll forest (Wood and Williams 1960), although other forms of vegetation (especially dry sclerophyll forest) are well represented in some areas. In wet sclerophyll forest, the tree stratum (consisting of all sclerophyllous trees) is dense and continuous, frequently with a discontinuous understorey of shade

tolerant trees; the shrub stratum (consisting of mesomorphic and sclerophyllous shrubs) is also dense and continuous; and the herbaceous stratum is poorly developed, although ferns may be common. Thus climax wet sclerophyll forest prevents solar radiation penetrating to the ground, except where there are natural clearings such as along rivers and creeks, around swamps, and in rocky areas. Such dense forests are largely inaccessible to heliothermic (basking) reptiles which use solar radiation for maintenance of elevated body temperatures. Thigmothermic (non-basking) reptiles can invade these forests, but, as East Gippsland is in the temperate zone where temperatures are low, this imposes a severe thermal stress and necessitates lowered thermal preferences.

Reptilian Fauna

Twenty-four of the twenty-nine species known to occur in East Gippsland are heliotherms and they are most abundant in areas where solar radiation can penetrate to the ground, e.g. the margins of rivers, creeks and swamps; rocky outcrops; burnt or cleared areas; and areas where the vegetation is open. Of the five thigmothermic species, one (*Denisonia nigrescens*) is nocturnal and the other four are fossorial litter inhabitants (*Leiolopisma delicata* and *L. mustelinum* in forest clearings at the lower altitudes, *Hemiergis decresiensis* in open vegetation such as woodland or shrubland, and *Siaphos maccoyi* in wet sclerophyll forest at the higher altitudes). It is interesting to note that only one species (*S. maccoyi*) actually lives in the wet sclerophyll forest, and that the thigmothermic families *Gekkonidae* and *Typhlopidae*, which are well represented in the warmer parts of Australia, are absent.

Recent work has suggested that there are four reptilan species complexes in SE. Australia (Rawlinson unpublished). Three of these complexes have been studied in detail, but the other is incompletely known. In spite of this, the evidence to hand shows that the *Egernia cunninghami*, *Denisonia superba* and *Notechis scutatus* complexes are represented in East Gippsland by only one taxon and the *Sphenomorphus quoyi* complex by two taxa. The complexes are discussed below under the relevant species headings.

In the following locality records, data for each species are presented under four headings:

1. Specimens examined: includes the localities of all specimens examined in the collections of the University of Melbourne Zoology Department (MUZD) and the National Museum of Victoria (NMV).
2. Specimens observed: includes the author's field records of all reptiles seen but not collected.
3. Literature records: includes all known literature records for East Gippsland.
4. Distribution: gives the general distribution of all East Gippsland reptiles based on the author's collecting in SE. Australia and reliable literature records.

Chelonia
Chelyidae

Chelodina longicollis (Shaw)

Specimens Examined: (MUZD) Nil. (NMV) Nil.
Specimens Observed: Orbost; Lake Tyers.
Literature Records: Southern rivers of Gippsland (McCoy 1878).

DISTRIBUTION: Coastally from Tropic of Capricorn southwards to Sale region, Victoria. Also occurs throughout the Murray-Darling River system, extending from this system into SW. Victoria and SE. South Australia via the Grampians.

SQUAMATA
LACERTILIA
AGAMIDAE

Amphibolurus diemensis (Gray)

SPECIMENS EXAMINED: (MUZD) Native Dog Plain, 4½ miles SW. of Mt. Cobberas; ½ mile E. of Native Dog Plain. (NMV) Nil.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Tasmania, Flinders Is., highlands of E. Victoria and SE. New South Wales to the Blue Mountains.

Amphibolurus muricatus (Shaw)

SPECIMENS EXAMINED: (MUZD) Wallaby Rocks, Wulgulmerang; Buchan Caves; Mallacoota. (NMV) Snowy R.; Lakes Entrance.

SPECIMENS OBSERVED: 15 miles W. of Orbost.

LITERATURE RECORDS: Nil.

DISTRIBUTION: SE. Australia from about the Queensland border southward along the coastal and inland margins of the Eastern Highlands. Also occurs in SE. South Australia and SW. Australia.

Physignathus lesueuri (Gray)

SPECIMENS EXAMINED: (MUZD) Suggan Buggan R., Suggan Buggan; 5½ miles N. of Gelantipy; Scrubby Ck, N. of Buchan. (NMV) Upper reaches of Buchan R.; Junction of the Snowy and Broadbent Rivers; Orbost.

LITERATURE RECORDS: Upper reaches of the Buchan R. (McCoy 1878); Buchan and Snowy Rivers (Lucas and Frost 1894); Gippsland (Worrell 1963).

DISTRIBUTION: E. coast of Australia from the Cape York Peninsula (Qld.) to Walhalla in SE. Victoria. The Gippsland form has been described as a subspecies, *P. lesueuri howitti* (McCoy 1878).

SCINCIDAE

Egernia cunninghami (Gray)

Egernia cunninghami complex: This complex is poorly known, and at present it appears that there are three taxa, all of which are restricted to SE. Australia. The first taxon occurs in the E. coastal region of New South Wales, the second taxon on the W. margin of the Eastern Highlands in New South Wales and along the Murray R. into South Australia, and the third taxon on the margins of the Eastern Highlands in S. New South Wales and Victoria. The latter taxon is the only one occurring in East Gippsland.

SPECIMENS EXAMINED: (MUZD) 7 miles S. of Suggan Buggan. (NMV) Rockbank, 7 miles N. of Wulgulmerang; Gelantipy.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: E. coast of Australia from SE. Queensland to E. Gippsland, also occurs along the inland margin of the Eastern Highlands into N. Victoria and SE. South Australia, penetrating into SW. Victoria through the Kilmore Gap.

Egernia saxatilis Cogger

SPECIMENS EXAMINED: (MUZD) 7 miles S. of Suggan Buggan; 2 miles N. of Cann River; 8 miles SE. of Sardine Creek. (NMV) Gelantipy; Wingan; Mt. Wills.

SPECIMENS OBSERVED: Bemm R., 8 miles ENE. of Bell Bird Creek.

LITERATURE RECORDS: Croajingolong (Lucas & Frost 1894 as *Egernia striolata*).

DISTRIBUTION: Rocky outcrops along the Eastern Highland from SE. Queensland to the Grampians in W. Victoria. The Gippsland form fits Cogger's (1960) subspecies *E. saxatilis intermedia.*

Egernia whitei (Lacepede)

SPECIMENS EXAMINED: (MUZD) Native Dog Plain, 4½ miles SW. of Mt. Cobberas. (NMV) Buchan.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Coastal regions and highlands of SE. Australia. Also occurs in Tasmania, the Bass Strait islands, SE. South Australia and SW. Australia.

Emoia spenceri Lucas & Frost

SPECIMENS EXAMINED: (MUZD) Mt. Delegate; Delegate R., 5½ miles SW. of Bendoc. (NMV) Nil.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Croajingolong (Lucas & Frost 1894).

DISTRIBUTION: Highlands of SE. New South Wales and E. Victoria from Mt. Franklin (A.C.T.) to Lake Mountain (Vic.). Also occurs in the Otway Ranges, SW. Victoria.

Hemiergis decresiensis (Fitzinger)

SPECIMENS EXAMINED: (MUZD) Nil. (NMV) Honeysuckle Track, Gelantipy; Buchan.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Honeysuckle Track, Gelantipy (Brazenor 1947).

DISTRIBUTION: E. New South Wales, E. Gippsland, N. Victoria, SE. South Australia and Kangaroo Is.

Leiolopisma delicata (De Vis)

SPECIMENS EXAMINED: (MUZD) 1½ miles N. of Goongerrah; Goongerrah Ck, Goongerrah; 12 miles N. of Cann River; Dead Calf Ck, 5 miles S. of Goongerrah; 8 miles E. of Genoa; 2 miles N. of Cann River; 2 miles N. of Mallacoota; 12 miles E. of Cann River; 15 miles NNE. of Orbost; 8½ miles ENE. of Orbost; Newtons Ck, 11½ miles W. of Cabbage Tree Creek; 2½ miles S. of Nowa Nowa; 5 miles SSW. of Nowa Nowa; Bemm River. (NMV) Cann River; Orbost.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: E. coast of Australia from SE. Queensland southward to just E. of Melbourne. Also occurs in NE. Tasmania.

Leiolopisma entrecasteauxi (Duméril & Bibron)

SPECIMENS EXAMINED: (MUZD) Square Flat, 2 miles NW. of Mt. Wombargo; 2 miles N. of Wulgulmerang. (NMV) Honeysuckle Track, Gelantipy.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Honeysuckle Track, Gelantipy (Brazenor 1947).

DISTRIBUTION: Southward along the Eastern Highlands from Mt. Barrington (N.S.W.), extending onto the coastal plains in S. Victoria and SE. South Australia. Also occurs on the Bass Strait islands and in Tasmania where it is restricted to the N. and E. coastal plains.

Leiolopisma guichenoti (Duméril & Bibron)

SPECIMENS EXAMINED: (MUZD) Suggan Buggan; 7 miles S. of Suggan Buggan; 2 miles N. of Wulgulmerang; 5½ miles N. of Gelantipy; 5½ miles N. of Goongerrah; Goanna Ck, 1 mile N. of Goongerrah; 12 miles N. of Cann River; East Buchan; 8 miles E. of Genoa; 2 miles N. of Cann River; Poddys Ck, 8 miles NE. of Bell Bird Ck; 15 miles N. of Orbost; Bemm River. (NMV) Rockbank, 7 miles N. of Wulgulmerang; Buchan; Bruthen; Cann River; Orbost.

SPECIMENS OBSERVED: 4½ miles N. of Goongerrah.

LITERATURE RECORDS: Nil.

DISTRIBUTION: SE. and SW. Australia generally, from the coast inland to about the 20 inch isohyet. On the E. coast, *L. guichenoti* does not extend much further north than Brisbane, and it is absent from the highlands in SE. New South Wales and Victoria.

Leiolopisma mustelinum (O'Shaughnessy)

SPECIMENS EXAMINED: (MUZD) Little R., 5 miles NNE. of Wulgulmerang; 2 miles N. of Wulgulmerang; 3 miles N. of Goongerrah; Goanna Ck, 1 mile N. of Goongerrah; Martins Ck, 2½ miles N. of Sardine Creek; Buchan Caves; 2 miles N. of Cann River; 12 miles W. of Cann River; 2 miles N. of Mallacoota; Fairhaven, Mallacoota; 7 miles ENE. of Bell Bird Creek; 9 miles ENE. of Orbost; 8½ miles E. of Orbost. (NMV) Jungle at head of Basin Ck.

SPECIMENS OBSERVED: 4½ miles N. of Goongerrah.

LITERATURE RECORDS: Croajingolong (Lucas & Frost 1894).

DISTRIBUTION: E. coastal Australia from Mt. Barrington (N.S.W.) to just E. of Melbourne.

Leiolopisma trilineatum (Gray)

SPECIMENS EXAMINED: (MUZD) Suggan Buggan; Square Flat, 2 miles NW. of Mt. Wombargo; 5 miles N. of Bentleys Plains; Mabel Cave, East Buchan. (NMV) Nil.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Coastal and inland margins of the Eastern Highlands in SE. Australia from about the Warrumbungle Ranges south. Also occurs in SW. Australia, SE. South Australia, the Bass Strait islands and the coastal regions of N. and E. Tasmania.

Leiolopisma weeksae? Kinghorn

SPECIMENS EXAMINED: (MUZD) 2 miles N. of Wulgulmerang; 5 miles W. of Goongerrah. (NMV) Honeysuckle Track, Gelantipy.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Honeysuckle Track, Gelantipy (Brazenor 1947 as *Leiolopisma metallicum*).

DISTRIBUTION: Inland margin of the Eastern Highlands in SE. New South Wales from Jenolan southwards into Victoria, crossing the watershed in W. central Victoria and penetrating to the Otway Ranges.

Siaphos maccoyi Lucas & Frost

SPECIMENS EXAMINED: (MUZD) Ridge above Nunyong Plains; Little R., 5 miles NNE. of Wulgulmerang; 2 miles N. of Wulgulmerang; Bonang; 3 miles S. of Bonang; 5½ miles N. of Goongerrah; 4½ miles N. of Goongerrah; Goanna Ck, 1 mile N. of Goongerrah. (NMV) Rockbank, 7 miles N. of Wulgulmerang; Gelantipy; 5 miles S. of Tullochard near Gelantipy; Jungle at head of Basin Ck.; Wingan; Lakes Entrance.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Croajingolong (Lucas & Frost 1894); Honeysuckle Track, Gelantipy (Brazenor 1947).

DISTRIBUTION: Highlands of SE. New South Wales and E. Gippsland from Talbingo (N.S.W.) south, then extending into W. Gippsland and SW. Victoria along the forested coastal plains and southern slopes of the Eastern Highlands.

Sphenomorphus tympanum (Lonnberg & Andersson)

Sphenomorphus quoyi complex: Four morphologically distinct forms of the Water Skink, *Sphenomorphus quoyi*, occur in SE. Australia, only one of which is not restricted to the Bassian subregion. Three forms are represented by widespread and largely allopatric populations, and the other by disjunct alpine populations included within the ranges of these three. Only two of the forms (*S. quoyi* and *S. tympanum*, cool temperate form, see below) have not been found in sympatry and, as there are no indications of hybridization in sympatric populations (Rawlinson, unpublished), it appears that all forms have reached species status. A detailed account of speciation in the *S. quoyi* complex is planned, but since two of the taxa occur in East Gippsland, a summary of the nomenclatorial conclusions seems desirable at this stage.

Quoy and Gaimard (1824) described and figured a skink collected at Neutral Bay, Sydney. They did not name it as a new species, however, simply referring to it as the 'Scinque à flancs noirs'. Duméril and Bibron (1839) re-described the specimen and named it as a new species, *Lygosoma quoyi*. Following the most recent revision of lygosomid skinks (Mittleman, 1952) this species is currently known as *Sphenomorphus quoyi*. Lonnberg and Andersson (1913) described and named a new skink, *Lygosoma tympanum*, 'said to have been collected in the neighbourhood of Melbourne'. Subsequently, Kinghorn (1932) described a new skink from Mt. Kosciusko which he named *Hinulia quoyi kosciuskoi*. Loveridge (1934) placed *tympanum* in the genus *Sphenomorphus* and made it a subspecies of *S. quoyi*. At the same time he synonymized *kosciuskoi* with *tympanum*.

Collections made at type localities, comparisons of topotypes to original descriptions, examination of the original figure of *S. quoyi* (Quoy and Gaimard, 1824, Pl. 42, fig. 1) and the type series of *S. quoyi kosciuskoi* (Australian Museum) have enabled positive identifications to be made of *quoyi*, *tympanum* and *kosciuskoi*. These taxa represent three of the four morphological forms of the *S. quoyi* complex. The fourth taxon is closely related to *tympanum*, but is apparently undescribed. It has previously been referred to as *Sphenomorphus sp. nov.* (Rawlinson, 1967). As my unpublished results indicate that Loveridge (1934) was wrong in synonymizing *tympanum* and *kosciuskoi*, the two taxa are re-established in this paper. Also, as my evidence indicates that all taxa have

reached species status, *tympanum* is restored to specific rank. This explains the use of the name *Sphenomorphus tympanum* in this paper.

In East Gippsland, *S. tympanum* and the closely related undescribed form occur. Locality data for each taxon must therefore be separated, so *S. tympanum* (*sensu lato*) has been divided into two groups. The first group, described as the 'Cool Temperate Form', is the typical form of *S. tympanum*. The second group, described as the 'Warm Temperate Form', is the undescribed (and probably specifically distinct) form of *S. tympanum*.

Cool Temperate Form

Specimens Examined: (MUZD) Quambat Plain, 7½ miles NNE. of Mt. Cobberas; Head of Indi R., 1½ miles E. of Quambat Plain; Native Dog Plain, 4½ miles SW. of Mt. Cobberas; Ridge above Nunyong Plains; Back R. bridge, 5 miles N. of Bentleys Plains; 2 miles N. of Wulgulmerang; 5½ miles N. of Gelantipy; Mt. Delegate; 2½ miles SW. of Bendoc; 11 miles SW. of Bendoc; 8½ miles N. of Goongerrah; 7½ miles N. of Goongerrah; 5½ miles N. of Goongerrah; 4½ miles N. of Goongerrah; 5 miles W. of Goongerrah. (NMV) Wombargo Ck, 7 miles SW. of Suggan Buggan; Rockbank, Wombargo Ck, 7 miles N. of Wulgulmerang; Honeysuckle Track, Gelantipy.

Specimens Observed: Nil.

Literature Records: Wombargo Ck 3000′, 5 miles W. of Suggan Buggan (Brazenor 1947).

Distribution: Highlands of SE. New South Wales and Victoria, from the Brindabella Ranges (A.C.T.) southward. Occurs throughout the Victorian coastal plains from Stradbroke (W. Gippsland) W. to about Mt. Richmond (SW. Victoria).

Warm Temperate Form

Specimens Examined: (MUZD) Native Dog Plain, 4½ miles SW. of Mt. Cobberas; Ingeegoodbee R., 5 miles N. of Suggan Buggan; 4 miles S. of Willis; Suggan Buggan R., Suggan Buggan; Tullochard Gorge, 3 miles W. of Butchers Ridge on Snowy R.; 5 miles N. of Goongerrah; 1 mile N. of Goongerrah; Goongerrah Ck, Goongerrah; 5 miles N. of Chandlers Creek; Junction of Murrindal R. and Butchers Ck, 12 miles NNE. of Buchan; Martins Ck, 10 miles SSE. of Goongerrah; Martins Ck, 2½ miles N. of Sardine Creek; Buchan R., 1 mile W. of Murrindal; Murrindal R., ½ mile E. of Murrindal; ½ mile E. of Genoa; Wild Dog Ck, 4 miles S. of Sardine Creek; 2 miles N. of Cann River; Wingan R., 10½ miles ESE. of Genoa; 8 miles SE. of Sardine Creek; 15 miles NNE. of Orbost; 9 miles ENE. of Orbost; Poddys Ck, 8 miles E. of Bell Bird Creek; 10 miles E. of Orbost; 8½ miles E. of Orbost; Bell Bird Creek; 2 miles N. of Bemm River; Bemm River. (NMV) Rockbank, Wombargo Ck, 7 miles N. of Wulgulmerang; Junction of Snowy and Broadbent Rivers; Snowy R. Gorge; Mouth of Betka R., Mallacoota; 10 miles S. of Buchan; Cann River; Orbost; Wingan Inlet.

Specimens Observed: Nil.

Literature Records: Honeysuckle Track, near Gelantipy (Brazenor 1947).

Distribution: Highlands of NE. New South Wales, coastal and inland margins of the Eastern Highlands in SE. New South Wales and NE. and SE. Victoria. Also occurs on the Fleurieu Peninsula, South Australia.

Tiliqua casuarinae (Duméril & Bibron)

Specimens Examined: (MUZD) Genoa; Gipsy Point. (NMV) Nil.

Specimens Observed: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Highlands and coastal regions of E. New South Wales and E. Gippsland from about Gosford (N.S.W.) southward to Mt. Hotham (Vic.). Also occurs in Tasmania where it is widespread.

Tiliqua nigrolutea (Quoy & Gaimard)

SPECIMENS EXAMINED: (MUZD) Suggan Buggan; 7 miles SW. of Bonang. (NMV) Gelantipy.

SPECIMENS OBSERVED: Tongio West.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Highlands of E. New South Wales and Victoria from about Gosford (N.S.W.) southward, extending onto the coastal plains in W. Gippsland, SW. Victoria and SE. South Australia. Also occurs in Tasmania and the Bass Strait islands, where it is widely distributed.

Tiliqua scincoides (Shaw)

SPECIMENS EXAMINED: (MUZD) Nil. (NMV) Nil.

SPECIMENS OBSERVED: Mallacoota; 16 miles WNW. of Orbost; 14½ miles WNW. of Orbost; 4 miles WSW. of Orbost.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Occurs throughout N. and E. Australia inside the 20 inch isohyet, missing only the highland regions of SE. New South Wales and E. Victoria (including the S. Gippsland Highlands). *T. scincoides* does not occur any farther W. than Adelaide (S.A.). Mitchell (1955) described the N. Australian form as a subspecies, *T. scincoides intermedia.*

VARANIDAE

Varanus varius (Shaw)

SPECIMENS EXAMINED: (MUZD) Nil. (NMV) Junction of Snowy and Broadbent Rivers.

SPECIMENS OBSERVED: 15 miles N. of Orbost; 17 miles WSW. of Cann River; 13 miles E. of Bruthen; 12½ miles E. of Nowa Nowa; 3 miles E. of Cabbage Tree Creek.

LITERATURE RECORDS: Cabbage Tree Creek; Andersons Inlet (Lucas & Frost 1894).

DISTRIBUTION: Throughout E. Australia inside the 20 inch isohyet, extending as far W. as Kangaroo Is. (S.A.). Does not occur in the highlands of SE. New South Wales and Victoria, or in W. Gippsland and SW. Victoria.

OPHIDIA

BOIDAE

Morelia argus argus (Linnaeus)

SPECIMENS EXAMINED: (MUZD) Nil. (NMV) 5 miles SSW. of Mallacoota.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Worrell (1963) records the species from Eden, New South Wales.

DISTRIBUTION: Coastal region of SE. Australia from Coffs Harbour (N.S.W.) to Mallacoota (Vic.). A subspecies, *M. argus variegata* is widely distributed over the rest of Australia except for S. Victoria and Tasmania.

ELAPIDAE

Demansia textilis (Duméril & Bibron)

SPECIMENS EXAMINED: (MUZD) Murrindal. (NMV) Gelantipy; Genoa.
SPECIMENS OBSERVED: 1 mile N. of Buchan; 3 miles S. of Genoa.
LITERATURE RECORDS: Nil.
DISTRIBUTION: In E. Australia, *D. textilis* is common on the dry inland plains. The species also penetrates down the E. coast into E. Gippsland and through the Kilmore Gap into the SW. Victorian plains, but it is absent from the highlands of SE. New South Wales and Victoria (including the S. Gippsland Highlands). The range of the species to the W. is unknown, as the taxonomic status of W. populations of *Demansia* has not been determined.

Denisonia coronoides (Günther)

SPECIMENS EXAMINED: (MUZD) Nil. (NMV) Orbost.
SPECIMENS OBSERVED: Native Dog Plain, 4½ miles SW. of Mt. Cobberas; Morass Ck, 5 miles S. of Mt. Misery.
LITERATURE RECORDS: Nil.
DISTRIBUTION: Coastal and highland regions of SE. Australia from Sydney southwards to Mt. Gambier in South Australia. Also occurs on the Bass Strait islands and Tasmania.

Denisonia nigrescens (Günther)

SPECIMENS EXAMINED: (MUZD) 8½ miles ENE. of Orbost; 5 miles SSW. of Nowa Nowa. (NMV) Orbost.
SPECIMENS OBSERVED: Wulgulmerang area; 5 miles S. of Buchan.
LITERATURE RECORDS: Nil.
DISTRIBUTION: Coastal regions of E. Australia from Cape York (Qld.) to just E. of Melbourne.

Denisonia superba (Günther)

Denisonia superba complex: This complex is restricted to the cool and cold temperate zones of the Bassian subregion (as defined in the introduction). There are two taxa in the complex, and these are represented by widespread and largely allopatric populations which overlap along the southern margin of the Eastern Highlands in E. Victoria. Although the two forms overlap extensively, especially to the NE. of Melbourne, sympatric populations have not been found to date. However, it appears that the two taxa have reached species status as no evidence of hybridization has been observed in specimens from the overlap zone. One taxon occurs in Tasmania, the Bass Strait islands, S. Victoria and SE. South Australia. This taxon (apparently the nominal form, as most of the type series came from Tasmania) has been designated the 'Lowlands Form' as where the two taxa contact, it is restricted to the lower altitudes. The second taxon occurs in the highlands of E. Victoria and E. New South Wales, with isolates in the Mt. Lofty Ranges and Kangaroo Island, South Australia. This is the only taxon found in East Gippsland and it has been designated the 'Highlands Form' as it is restricted to the higher altitudes where the two taxa contact. Rawlinson (1967) has previously referred to this form as *Denisonia sp. nov.*

HIGHLANDS FORM

SPECIMENS EXAMINED: (MUZD) Native Dog Plain, 4½ miles SW. of Mt. Cobberas; Morass Ck, 5 miles S. of Mt. Misery; 6 miles N. of Benambra; 4 miles

S. of Wulgulmerang; 3 mile S. of Gelantipy. (NMV) Benambra; Gelantipy; Bruthen.

SPECIMENS OBSERVED: 2 miles N. of Wulgulmerang; 4 miles N. of Gelantipy; Bonang; 3 miles N. of Sardine Creek.

LITERATURE RECORDS: Nil.

DISTRIBUTION: *Highlands form*: Highlands of SE. Australia from New England Tableland (N.S.W.) to Lake Mountain (Vic.). There is an isolate in the Mt. Lofty Ranges and on Kangaroo Is., South Australia. *Lowlands form*: Highlands of S. Gippsland and coastal plains of W. Gippsland, SW. Victoria and SE. South Australia. This form also occurs on the Bass Strait islands and in Tasmania.

Notechis scutatus (Peters)

Notechis scutatus complex: The genus *Notechis* is restricted to the Bassian subregion (*sensu* Serventy and Whittell, 1951). Two species and four subspecies have been described in the genus. However results of recent work (Rawlinson, 1967 and unpublished) have indicated that there are only two taxa—the two described species, *N. ater* and *N. scutatus*. *N. ater* has a disjunct distribution from Tasmania, through South Australia to S. Western Australia, while *N. scutatus* has a continuous distribution throughout the warm and cool temperate SE. of Australia. The latter taxon is the only one found in East Gippsland.

SPECIMENS EXAMINED: (MUZD) Morass Ck, 5 miles S. of Mt. Misery. (NMV) Orbost; Lakes Entrance; Croajingolong.

SPECIMENS OBSERVED: Nil.

LITERATURE RECORDS: Nil.

DISTRIBUTION: SE. Australia inside the 20 inch isohyet from Mt. Tambo (SE. Qld.) to Kangaroo Is. (S.A.). A closely related species, *N. ater*, occurs on Tasmania and the Bass Strait islands; the Flinders Ranges, Yorke and Eyre Peninsulas and offshore islands, South Australia; and SW. Australia (Rawlinson, 1967).

Pseudechis porphyriacus (Shaw)

SPECIMENS EXAMINED: (MUZD) 8 miles N. of Murrindal; 12 miles W. of Cann River; Lake Tyers. (NMV) Gelantipy; Tullochard, near Gelantipy.

SPECIMENS OBSERVED: 2 miles N. of Wulgulmerang; 15 miles N. of Buchan; 8 miles NE. of Genoa; 3 miles W. of Cann River; 1 mile W. of Cann River; 8 miles N. of Orbost; Bell Bird Creek; 5 miles W. of Nowa Nowa; 8 miles E. of Orbost.

LITERATURE RECORDS: Nil.

DISTRIBUTION: Coastal regions of E. Australia from Cape York (Qld.) to about Sale (Vic.). Crosses the Eastern Highlands in Queensland and penetrates along the Murray-Darling River system into South Australia. Also occurs along the inland margin of the Eastern Highlands in SE. Australia, penetrating into SW. Victoria through the Kilmore Gap.

Discussion

Twenty-nine reptile species are recorded from East Gippsland in this paper, 22 for the first time. The distributional data provided above for these species can be discussed along two main lines to reach separate, but related, conclusions. This is done under two headings:

1. Main reptile distribution patterns in East Gippsland.

2. The East Gippsland reptile fauna in relation to Australian zoogeographic subregions.

Before continuing, several points should be clarified. The present paper deals only with the reptiles of East Gippsland, but the ideas developed below are an expansion of previously published work on the reptiles of SE. Australia (Rawlinson, 1966, 1967). A checklist of the reptiles of SE. Victoria (Gippsland) and SW. Victoria was provided in one of these papers (Rawlinson, 1967, Table 1), but this has since proved inaccurate on four counts (Rawlinson, unpublished): 2 species, *Egernia luctuosa*, and *Morelia argus argus*, can now be added to the SE. Victorian list, bringing the total number of species to 33; 1 species, *Emoia spenceri*, can be added to the SW. Victorian list and 1 species, *Leiolopisma metallicum*, can be removed, the total number of species remaining at 30. On the latter point, recent evidence (Rawlinson, unpublished) has suggested that *L. metallicum* is absent from Western Australia, records for this species apparently being

TABLE 1

Distribution patterns of East Gippsland reptile species

Species	Thermal Zones occupied in East Gippsland			Zoogeographic Distribution		
	Warm Temperate only	Cool Temperate only	Warm and Cool Temperate	Exclusive Bassian	Transitional from Torresian	Transitional from Eyrean
Chelodina longicollis	+	−	−	−	+	−
Amphibolurus diemensis	−	+	−	+	−	−
A. muricatus	+	−	−	+	−	−
Physignathus lesueuri	+	−	−	−	+	−
Egernia cunninghami	+	−	−	+	−	−
E. saxatilis	−	−	+	+	−	−
E. whitei	−	−	+	+	−	−
Emoia spenceri	−	+	−	+	−	−
Hemiergis decresiensis	+	−	−	+	−	−
Leiolopisma delicata	−	−	+	+	−	−
L. entrecasteauxi	−	+	−	+	−	−
L. guichenoti	−	−	+	+	−	−
L. mustelinum	−	−	+	+	−	−
L. trilineatum	−	−	+	+	−	−
L. weeksae ?	−	+	−	+	−	−
Siaphos maccoyi	−	+	−	+	−	−
Sphenomorphus tympanum (Cool Temperate Form)	−	+	−	+	−	−
Sphenomorphus tympanum (Warm Temperate Form)	+	−	−	+	−	−
Tiliqua casuarinae	−	−	+	+	−	−
T. nigrolutea	−	+	−	+	−	−
T. scincoides	+	−	−	−	+	−
Varanus varius	+	−	−	−	+	−
Morelia argus argus	+	−	−	+	−	−
Demansia textilis	+	−	−	−	−	+
Denisonia coronoides	−	+	−	+	−	−
D. nigrescens	+	−	−	−	+	−
D. superba	−	+	−	+	−	−
Notechis scutatus	−	−	+	+	−	−
Pseudechis porphyriacus	+	−	−	−	+	−
Total	12	9	8	22	6	1

attributable to *L. guichenoti*, or a closely related form. The reptilian fauna of SE. Victoria thus includes at least 33 species, and 29 of these are known to occur in East Gippsland, the absentees being *Egernia luctuosa*, *Leiolopisma metallicum*, *Rhodona bougainvilli* and *Denisonia superba* (Lowlands form).

1. Main Reptile Distribution Patterns in East Gippsland

East Gippsland can be divided into two thermal zones (warm and cool temperate) as a consequence of the low and high altitudes (see introduction). The locality data provided above indicate that 12 species are restricted to the warm temperate zone, 9 species to the cool temperate zone and 8 species occur in both zones (see Table 1). This breakdown of East Gippsland reptile species agrees with their distribution in the warm and cool temperate zones of the Bassian subregion outside East Gippsland.

2. The East Gippsland Reptile Fauna in Relation to Australian Zoogeographic Subregions

The most generally accepted scheme for subdividing Australia into zoogeographic subregions is that proposed by Spencer (1896) and subsequently modified by Serventy and Whittell (1951) (see reviews in Keast, 1959 and Littlejohn 1967). In this scheme, four subregions are recognized: the temperate Bassian and South-Western subregions; the tropical Torresian subregion; and the arid Eyrean subregion. Burbidge (1960) has proposed almost identical divisions for the principle floristic zones in Australia: Tropical zone (= Torresian); Temperate zone (= Bassian and South-Western); and Eremaean zone (= Eyrean). As was mentioned in the introduction, Gippsland lies in the Bassian zoogeographic subregion, and Rawlinson (1966, 1967) has described its reptile fauna as Bassian, but without providing the data and principles on which this conclusion was based. Detailed distributional data on the reptiles of East Gippsland have been provided above, and the discussion can be developed to explain how these data fit the Bassian subregion concept.

Darlington (1957, pp. 419-428), when discussing the concept of zoogeographic regions, states: 'that the faunal regions are designed to represent the main features of distribution of *existing* animals, and that, although the causes that have produced present distributions lie in the past, any attempt to combine the past with the present in one system of regions must lead to confusion'. Thus zoogeographic regions must be based on static patterns, and Darlington (op. cit.) concludes: 'The system of faunal regions, then, represents the average, gross, pattern of many different animals with more or less different distributions'. This effectively summarizes the basis for dividing the Earth into zoogeographic regions, but it does not give a working idea of how such regions can be recognized. Keast (1959, p. 129), following Mayr (1945), provides definitions of regions and subregions based on the faunal elements to be expected: 'A zoogeographic region may be defined as a geographic subdivision of the Earth that is the home of a peculiar fauna. Such a region is characterized by the presence of many endemic genera and families and by the absence of the characteristic genera and families of other zoogeographic regions. A sub-region or faunal province by contrast can be held to be a somewhat lesser division, characterized by a series of endemic forms of lesser degree'. Using this definition, Rawlinson (1966) showed that there are great differences between the Bassian and Eyrean reptile faunas at the specific, generic and familial levels; and a similar, but less marked, difference exists between the Bassian and Torresian reptile faunas (Rawlinson, unpublished).

Few Bassian reptile taxa (especially species) have distributions co-extensive with the boundary of the Bassian subregion and there is no sharp cut-off of distributions at the Bassian boundary. This is not surprising, for Darlington (1957, p. 198), when discussing transitions and barriers in the distribution of reptiles between faunal regions, states: 'Where different faunas of reptiles meet there are not sharp boundaries but broad areas of transition—overlapping with progressive subtractions'. However, this presents another problem: which of the reptilian taxa occurring within the boundaries of the Bassian subregion are Bassian faunal elements, and how do the remaining taxa fit into the subregion concept? Darlington (1957, pp. 453-456) provides an answer to these questions when he points out that where two faunal regions are separated by partial barriers, complex transitions are to be expected, with overlapping of faunal elements and progressive subtraction in both directions. As a result of these transitions, the taxa in two partially separated regions can be divided into three categories:

1. Exclusive taxa: occur in one region only; these taxa delimit the region.
2. Transitional taxa: occur in both regions, but are extensive in one region and limited in the other.
3. Shared taxa: occur throughout both regions.

Burbidge (1960) recognized the significance of transition zones when she divided Australia into the three principal floristic zones mentioned earlier. Between these zones she has areas of transition which are divided into two categories:

(a) Interzones 1, 2 and 3; between the SW. Temperate and Eremaean, SE. Temperate and Eremaean and Tropical and Eremaean zones respectively. These are apparently simple areas of overlap with progressive subtraction in both directions.

(b) MacPherson MacLeay overlap; between the Tropical and SE. Tem-

TABLE 2

Zoogeographic elements present in the East Gippsland reptile fauna

Possible Distribution Pattern	Number of Taxa			
	Species	Super-Species	Genera	Families
1. Exclusive Bassian	22	3	1	—
2. Transitional Bassian to Torresian	—	—	1	—
3. Transitional Bassian to Eyrean	—	—	—	—
4. Transitional Bassian to Torresian and Eyrean	—	—	—	—
5. Transitional Torresian to Bassian	6	1	3	1
6. Transitional Eyrean to Bassian	1	—	1	—
7. Transitional Torresian and Eyrean to Bassian	—	—	5	2
8. Transitional Torresian to Eyrean and Bassian	—	—	—	—
9. Transitional Eyrean to Torresian and Bassian	—	—	—	—
10. Shared Bassian and Torresian	—	—	1	—
11. Shared Bassian and Eyrean	—	—	—	—
12. Shared Bassian and Torresian and Eyrean	—	—	4	3
Total	29	4	16	6

perate zones. This area is apparently a mosaic of Tropical and Temperate communities with progressive subtraction in both directions.

As the Bassian subregion is only partially separated from the adjacent subregions (Eyrean and Torresian), exclusive, transitional and shared taxa (species, genera and families) may be expected in the fauna. The East Gippsland reptile fauna then, could contain 12 zoogeographic elements, but Table 2 shows that only 7 of these possible categories are represented; 3 at the specific level, 2 at the superspecific (*sensu* Mayr, 1963) level, 7 at the generic level and 3 at the familial level.

Of the 29 species recorded from East Gippsland, 22 are exclusive to the Bassian, 6 are transitional from the Torresian and 1 is transitional from the Eyrean. These are all listed in Table 1.

At the superspecific (*sensu* Mayr, 1963) level, there are members of 4 species complexes present in East Gippsland; 3 (the *Egernia cunninghami*, *Denisonia superba* and *Notechis scutatus* complexes), are exclusively Bassian; and 1 (the *Sphenomorphus quoyi* complex), is transitional from the Torresian to the Bassian.

At the generic level, the East Gippsland reptilian fauna has: 1 exclusive Bassian genus (*Notechis*); 1 genus transitional from the Bassian to the Torresian (*Leiolopisma*); 3 genera transitional from the Torresian to the Bassian (*Chelodina*, *Emoia* and *Siaphos*); 1 genus transitional from the Eyrean to the Bassian (*Hemiergis*); 5 genera transitional from the Torresian and Eyrean to the Bassian (*Physignathus*, *Varanus*, *Morelia*, *Demansia* and *Pseudechis*); 1 genus shared between the Bassian and Torresian (*Sphenomorphus*); and 4 genera shared between the Bassian, Torresian and Eyrean (*Amphibolurus*, *Egernia*, *Tiliqua* and *Denisonia*).

At the familial level, the East Gippsland reptilian fauna has: 1 family transitional from the Torresian to the Bassian (*Chelyidae*); 2 families transitional from the Torresian and Eyrean to the Bassian (*Varanidae* and *Boidae*); and 3 families shared between the Bassian, Torresian and Eyrean (*Agamidae*, *Scincidae* and *Elapidae*).

The above analysis of the East Gippsland reptilian fauna reveals that it is essentially Bassian in nature, but the presence of the warm temperate zone has enabled certain transitional Torresian and Eyrean taxa to become established. The evidence presented indicates that it has been easier for Torresian taxa to become established in the area. These points are best exemplified at the specific level where 76% of the species are exclusively Bassian, 21% are transitional from the Torresian and 3% are transitional from the Eyrean. The higher taxonomic categories present a less clear picture: 3 species complexes (or superspecies, *sensu* Mayr, 1963) are exclusively Bassian; 1 genus is exclusively Bassian and 1 genus is transitional from the Bassian to the Torresian. All other taxa are transitional from, or shared with, the Torresian or Eyrean, but a stronger link with the Torresian is evident.

Conclusions

1. East Gippsland can be divided into two thermal zones, the warm and cool temperate, each of which has its own reptilian fauna.

2. Following the principles for zoogeographic regions and subregions laid down by Darlington (1957) and Keast (1959), the East Gippsland reptile fauna is considered to be Bassian in nature, but the warm temperate zone has enabled transitional Torresian and Eyrean taxa to become established.

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8

Forestry in East Gippsland

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Summary

Since the early years of settlement most of the forest of East Gippsland has sustained damage from wild fires. The opening of the railway to Orbost saw the commencement of selective utilization, which resulted in further degradation of adjacent forest stands. Despite geographical isolation a strong sawmilling industry has transferred into the region during the past twenty years, and currently produces 25 per cent of the State hardwood log output. Roading for utilization and fire protection has been developed in the forest area, but access to remote areas is still inadequate. Sawmilling has been organized so that significant economic advantage has been derived by communities with limited opportunity to develop by expansion of agriculture. Substantial agricultural expansion depends on alienation and development of land at present completely forested and contributing to the current log requirements of the sawmilling industry. Silvicultural improvement of the forest can be achieved by removal of residual trees and waste wood for utilization by a wood pulp industry.

Forest Reservation

In East Gippsland, reservation of large areas of forest has been possible because of remoteness from the pressure of expanding settlements, and difficulty of terrain. By the schedules of the 1907 Forests Act a total of almost 370,000 acres was reserved for forest purposes as follows:

Forest Blocks at	Bendoc	70,500 ac.
,, ,,	,, Noorinbee	139,608 ac.
,, ,,	,, Dellicknora	10,660 ac.
,, ,,	,, Nerran	35,600 ac.
,, ,,	,, Orbost	30,440 ac.
,, ,,	,, Wulgulmerang	3,270 ac.
,, ,,	,, (Part) Enano	11,470 ac.
,, ,,	,, (Part) Tambo	60,620 ac.
,, ,,	,, (Part) Colquhoun	6,637 ac.
,, ,,	,, Tildesley	860 ac.
Total		369,665 ac.

The majority of these forest blocks were remote from markets and some of the areas were apparently reserved, despite poor tree growth, as watershed protection areas.

With the construction of the railway to Orbost (1916), the forests within 10-15 miles of the line were tapped and utilized to produce sleepers and other hewn timbers. The undoubted value of these forests to this industry resulted in the dedication of 17,590 acres for forest purposes to the NE. of Nowa Nowa in 1916 and a further 30,000 acres W. of Orbost in 1930.

Minor adjustments were made to forest boundaries in 1935 by the excision of almost 3,000 acres in the vicinity of farming settlements; but a valuable belt

of high quality forest of some 20,500 acres was reserved in the Goongerah-Bendoc area. In the Derndang-Wangarabelle area 3,716 acres of box forest was reserved in 1938, and subsequently over many years, yielded box poles and piles, and more than one million superficial feet of logs to provide durable timber used in the manufacture of Victorian Railways rolling stock.

Abandoned farms in the dense forests of Murrungowar and Kuark added 3,690 acres to the forest reserve in 1940, and an additional 5,030 acres in 1949. The potential of this area for growth of forest can be gauged from the fact that the 80-90 ft test piles driven at Kings Bridge were cut here, as were four 120 ft poles, required for developmental structures at Woomera (1956).

With the support of Sir Albert Lind, Minister of Forests, and member for East Gippsland, an area of 163,000 acres of forest extending from Orbost E. to beyond the Bemm River was reserved in 1951. This was the largest block of forest reserved in East Gippsland this century. Permanent reservation has ensured log supplies to local millers and the expenditure of Forests Commission funds in managing and regenerating the forest. The last major addition to the forest estate was in 1960 when 46,500 acres of prime forest on the Errinundra tableland was reserved. Since 1930 a total of 10,538 acres of reserved forest area has been relinquished to adjust forest boundaries and to remove from the forest estate areas with low potential for forest growth.

The net area of forest reserve in eastern Gippsland is:

Gazetted in 1907	369,665 ac.
Subsequent dedications	289,964
	659,629
Less excisions	10,629
Permanently reserved	649,000 ac. net.

This area comprises 11½ per cent of the total reserved forest area in the state, but is 25 per cent of the area of this part of East Gippsland.

Land tenure within the region is as follows:

Protected Forest (unoccupied Crown lands)	1,611,000 ac.	61%
Reserved Forest	649,000 ac.	25%
National Parks	40,000 ac.	2%
Alienated Lands	300,000 ac.	12%
(4,100 sq. mls.)	2,600,000 ac.	

The imbalance between the area of permanent farmland, with its scattered population and small townships, and the huge area of forested land, indicates the degree of development that is still required in the region and the importance of the forest resource. A large proportion of the Crown land is forested and capable of yielding forest produce at the present time. However, the long rotation necessary to replenish the forests on sites of low productivity would not warrant permanent reservation, nor intensive management. Other large areas of Crown land, particularly in the Snowy River valley, do not carry merchantable timber and due to ruggedness of terrain are quite unsuitable for conversion to farmland. The vegetation forms a protection forest for these sites, and in future, portions of these areas may be reserved as National Parks or as Wilderness Areas.

The crop on Crown land is of importance to the timber industry at the present time, but in the future when the permanent forests are managed to

produce the maximum growth from the site, it can be anticipated that Crown lands, and even some forest reserves of lower timber production potential, may be released for agricultural purposes.

Early Utilization

Pit sawing of timber at Bendoc, when gold mining was in progress there in 1852, may have been the earliest forest utilization in the region. A sawpit has also been discovered on the Nunniong tableland under Mt. Bindi; so it is reasonable to assume that pit sawing to produce better finished building and construction timbers may have been an adjunct to most of the early permanent settlements.

The opening of the Melbourne-Sale railway in 1878 and its extension to Bairnsdale in 1888 provided a ready outlet for produce cut from the forests adjoining the Gippsland Lakes. Milling had developed there previously to supply local needs, but now it was practicable for produce to be cut near the Lakes and transported by water and rail to an increasing market. At this distance from the market however, only special timbers, not readily available elsewhere, were in demand.

Eucalypt species that could supply heavy construction timbers, either sawn or hewn, were sought through these forests—red iron-bark, grey box, red gum and red box. The produce ranged from the red gum paving blocks for Melbourne streets to piles of iron-bark and box for harbour works; sawn red gum planks 12 in. x 2 in. and 35 to 45 ft long; and red gum beams for dock gates—42 ft long and 24 in. square. There is a record too of a grey box keel 66 ft long cut in these forests.

With this type of utilization the nearest and best trees were selected. The best tree was one with least defect that could supply the most timber for the effort of felling it. This type of selective logging left only trees of poor form and quality or those too remote for harvesting.

Until the railway extended to Orbost in 1916, the only forest utilization, other than for domestic needs, was in the vicinity of Lake Tyers, at Tabbara, and at Bendoc. However, large areas of forest received severe damage from the recurrent fires that escaped from the settlers' clearing operations or were lit to encourage growth of cattle feed on the floor of the forest.

Forest Fires

Forest fires have always been a factor of the environment of the region. In the past these had originated principally from natural causes, such as lightning; occasionally from the use of fire by aboriginals. Considering the uniform age of a forest stand of the ash group of eucalypts occurring in the region and the silvicultural requirement of the species for regeneration, it is evident that fires swept the forest at intervals during the pre-settlement period.

After the settlement of the limited areas of sparsely forested land, the pioneers turned to the less dense forest of the coastal plain and to the highly fertile soils of the river flats and valleys. The massive logs and accumulated debris were burned to prepare the land for pasture. This fuel was rarely dry enough to burn satisfactorily, except in summer, and inevitably these clearing fires escaped. Scars in the forest from escape fires are clearly shown by the dead stags and dead-topped trees in the Combienbar and Errinundra valleys.

Stock was grazed in the forests around settlements, and experience had shown that cattle would thrive on the regeneration of grass, herbs and shrubs following a fire. Two to three years after burning, palatable feed became scarce. Another section of the forest would then be fired because the accumulation of at least five

years forest litter was necessary before burning could be repeated successfully on any area.

Many of the Crown lands were made available by the Lands Department as grazing leases of some 30,000 acres each. It was inevitable that systematic burning was used to promote the growth of forage. Although cattlemen wanted a localized fire which limited the far ranging of stock, the timing of the burn was difficult, and instead of a low intensity fire burning under climatic controls late in the season, forest fires often raged out of control.

The chaotic structure of the forest stands of the foothills and mountain slopes is a result of repeated burning of the forests in the past. There are few areas with no evidence of past fires, and many which have been swept by fires recurrent and intense. The species of the coast and foothills are fire resistant, and although mature trees are only sometimes killed by burning, dense regeneration of eucalypt saplings and scrub is often induced by fire.

Later fires reduce this sapling regrowth, but the survival of stems that regenerate new crowns, or coppice from the butt, with the older trees, overstocks the forest site. Older trees with fire scars are susceptible to attack by termites, longicorn beetles and fungi; and the timber has suffered degrade through the presence of kino in the form of gum veins and pockets in the wood. Competition in the over-stocked stands results in retarded growth of all stems, rendering them susceptible to insect and fungal attack.

Recurrent fires sweeping through regeneration of varying age and stocking, followed by a fresh crop of regeneration, have caused a wide variety of irregular age classes and a variety of stocking densities.

The Hewn Timber Industry

The extension of the railway to Nowa Nowa (1914) and to Orbost (1916) opened up forests of 'hardwood' eucalypt species acceptable for railway sleepers, viz: red iron-bark (*E. sideroxylon*, A. Cunn.), Gippsland grey box (*E. bosistoana*, F.v.M.), red box (*E. polyanthemos*, Schau), and yellow stringybark (*E. muelleriana*, Howitt).

Beams hewn from these species were also in demand for heavy wooden constructions, wharfs, bridges, etc. Some control was exercised in the forest to ensure that immature trees were not utilized and that larger trees were reserved to supply beam timber.

The sleeper hewer was a contractor to the Railways Department on piece work, and largely dependent for his livelihood on the Railway requirement of sleepers. The more skilful hewers were able to increase their earnings by supplying beams and octagonal dressed poles.

By 1920 some 60 per cent of the State requirement of hewn beams and 25 per cent of the sleepers were being produced from the east of Nowa Nowa. The revenue derived however, was only 3 per cent of the Forests Commission's income. During the depression, Railway requirements of sleepers were allocated in small lots or quotas to up to 320 hewers in the area to provide a subsistence income. This quota system has continued to be a feature of the contract between the hewer and the Railways Department.

As suitable timber for hewing became depleted within wagon reach of the railway, the sleeper carters invested in motor lorries. By 1930 timber stands 20 miles from rail were being utilized and the Forests Commission by 1935 was assisting to establish roads to suitable stands of timber at greater distances.

In view of increasing difficulty in obtaining supplies of the 'hardwood' sleepers the Railways in 1938 accepted supply of sleepers cut from southern mahogany (*E. botryoides*, Sm.), white stringybark (*E. scabra*, Dum-Cours.), and messmate stringybark (*E. obliqua*, L'Her), and in addition in 1943, Yertchuk (*E. consideniana*, Maiden), became an acceptable species. Any 'hardwood' sleepers supplied fetched a slight premium in price.

During the 1939-45 war period the Railways requirement of sleepers was reduced to a minimum and only 55 hewers were in employment in the area.

The post-war period saw an increase in sleeper prices to attract hewers into the industry, but the output of sleepers per man did not increase correspondingly. The reverse was the case and the hewer worked shorter hours to obtain sufficient sleepers to provide an income slightly better than day wages. Further concessions were made by the Railways in 1946 when mountain grey gum (*E. cypellocarpa*, L. Johnson), blue gum (*E. bicostata*, Maiden, Blakely and Simmonds), and red stringybark (*E. macrorrhyncha*, F.v.M.) were accepted, and in 1948 silvertop (*E. sieberi*, L. Johnson), in an attempt to overcome deficiencies in railway track main-

A young cabbage tree palm which has not yet grown above the tops of the surrounding trees. (*W. B. Spencer, 1889.*)

tenance brought about by the war years. In 1947 there were 105 hewers in the industry, but the Railways requirement of sleepers exceeded the supply.

In order to overcome deficiencies in supply the Railways sought sawn sleepers from the saw mills and introduced mobile benches into the forest to saw sleepers from cull trees. This permitted an opportunity for unskilled New Australians and, as well as the chain saw, they introduced the mobile swing saw to the industry. This marked the end of the need for the hewer's particular skill, and during the decade from 1950 mechanization has resulted in a revolution of the sleeper industry.

The Railway requirement for sleepers that had been in the order of 250,000-350,000 per year pre-war increased in post-war years to 500,000-600,000 per year. Until 1950 East Gippsland supplied some 25 per cent of the requirement but since that date, 45-50 per cent of the total sleepers produced have come from east of Nowa Nowa. The work force engaged in the industry has varied between 102 in 1950 to 192 in 1955, but 1966 saw a decline to only 70, following a decrease in the requirement by the Railways.

The 1955 pattern of production that supplied 278,000 sleepers (46 per cent of State requirement), was 3 benches, 28 swing saws and 75 broad-axemen, a work force of 192. With the industry re-established and capable of supplying the annual requirement, the Railways in 1957 ceased to accept sleepers from those species introduced after 1946, and from messmate. By 1966 the broadaxe had practically disappeared, but only 126,800 sleepers (26 per cent of requirement) were produced by 70 operators.

In addition to sleepers for the Victorian Railways the period 1940-56 saw the production east of Genoa of sleepers for export from Eden to New Zealand. At various periods sleepers have been cut for the Melbourne and Metropolitan Tramways Board and for the State Electricity Commission.

The output of hewn beams, once of considerable importance in this area, has now declined, as such timbers can be largely replaced by sawn products.

During the past 50 years the hewing industry has required the utilization of from 5-15 million superficial feet (s.ft) Hoppus Log Volume (H.L.V.) per year for the production of sleepers, beams, crossing timbers etc. Despite additional species being acceptable for sleepers for a period, the continuous selection of merchantable trees for conversion has resulted in degeneration of the forest stands of the coastal plain and lower foothills. The remaining faulty old trees and suppressed stems of poor form produce only inferior wood and distance from markets has made this economically unusable.

The Sawmilling Industry

Sawmilling was by 1946 centred at Nowa Nowa (one mill) Cabbage Tree Creek (one mill), Orbost (one mill), Bendoc (three mills) and Bonang (one mill), but the annual log requirement was less than five million s.ft per year. There was an intermittent demand for logs to supply special class timbers and up to 500,000 s.ft H.L.V. was despatched by rail to Melbourne. Log despatches comprised logs of blue gum to State Electricity Commission, iron-bark and messmate to Victorian Railways, and even kanooka (*Tristania laurina*, R.Br.) for manufacture of tobacco pipes.

Sawn timber was largely despatched to towns close to the area but a proportion found a market in the Latrobe Valley. The Public Works Department, Harbour Trust and Country Roads Board had a firm requirement for timber of special dimensions cut largely from yellow stringybark. Silver wattle (*Acacia dealbata*,

Link.) case material was supplied for fish cases at Eden and Sydney, and for butter boxes at local factories and further afield.

The manpower shortage during the war restricted sawmilling in the region, and the majority of the mills in the State were geared to the salvage of the mountain ash forests destroyed in the 1939 fires. Although milling of salvage logs continued until the fifties, by 1946 the growing demand for timber and the depletion of logs from salvage sites, caused millers from the central areas of the State to seek log allocations from the forests of East Gippsland. After formulation of cutting plans, the Forests Commission granted log allocations and 1947 saw the first of these new sawmills in production at Cabbage Tree Creek. Two more mills commenced in Orbost in 1948, another in 1949, and in 1950 two more in Cabbage Tree Creek and another at Waygara.

The industry that transferred to the region had well-established customers, marketing procedures, and timber yards. Management and employees were skilled in logging and milling, and had the advantage of techniques developed during the ash salvage programme: the bulldozer for snigging and road construction, the articulated timber jinker for log cartage, and the recently developed chainsaw for improved log production.

The trickle of sawn timber from East Gippsland now became a steady stream as annual intake of logs climbed by 1950 to a volume of 25 million s.ft H.L.V. Although a large volume of production for this region, it represented only 7 per cent of hardwood log intake for the State. When the economic recession occurred in 1952, thirty-four sawmills were located in twelve settlements in the region (see Appendix 1).

Despite decreased production due to economic restrictions over the ensuing two years, additional mills opened at both Waygara and Cabbage Tree Creek (36 total). In 1955 log intake to these mills had climbed to 65 million s.ft H.L.V., representing 15 per cent of the State hardwood log intake. Additional mills were established in 1956 at Bendoc, Sardine Creek and Club Terrace (39 total).

Except at Bendoc and Gelantipy the East Gippsland mills were established to draw logs from the forests of the coastal and foothill zones. These forests yielded scantling and a useful proportion of merchantable timber, and special construction timber from durable species. The harvesting operation was by tree selection, which although preserving advanced regrowth, results in the faulty and suppressed stems becoming an increasing proportion of the forest.

High grade timber suitable for production of quality boards, dressed floorings, lining, and joinery, was produced at Gelantipy, Bendoc and eventually at Buchan and Nowa Nowa when the forests of Nunniong tableland were opened to utilization.

During the past decade additional allocations of logs from the coastal and foothill forests have been made, principally for mills establishing in Cann Valley, Bemm River, etc. The forest of the Errinundra tableland and adjacent valley heads contains a high proportion of shining gum (*E. nitens*, Maiden), cut tail (*E. fastigata*, Deane & Maiden), mountain ash (*E. regnans*, F.v.M.) and alpine ash (*E. delegatensis*, R. T. Baker), and this forest was reserved from utilization.

During the past few years supplies of high grade timber in the Central Highlands and North Gippsland have diminished, and allocations of logs from the high quality forest of the Errinundra tableland have now been made. Additional plants to mill this timber have been established, or are projected for early construction.

At the present time forty-three sawmills are based on sixteen settlements in East Gippsland. (See Appendix 1.) During the past financial year, out of an

available allocation of 121 million s.ft, these mills utilized 107 million s.ft, contributing 25 per cent of the State hardwood log requirement.

Forests Commission Activities

(a) Fire Protection

Supervision of forest operations in East Gippsland was strengthened in 1920 by the addition of professional foresters to the staff. Although responsible for fire protection in the whole of the region, the forester was not aware of fires which often occurred in remote areas. Telegraphic communication was lacking, and horse transport precluded the possibility of reaching a fire when it was at a controllable size. Additional staff, recruited from among experienced forest workers, provided closer supervision of utilization and permitted development of fire protection and fire suppression, within the vicinity of the railway and southern settlements.

To facilitate the expansion of the hewing industry to more remote forests, construction of extraction roads to a developmental plan began about 1935, and the forester was issued with motor transport to permit more adequate supervision. There were less than 60 miles of trafficable road within the forested area in 1939, although there were many hundreds of miles of abandoned sleeper tracks which were suitable for rapid improvement for light traffic.

The havoc of the 1939 fires gave impetus to the construction of roads through the forests, primarily to provide a means of rapid access to fires. Plans for these roads embraced the whole of the State Forest and with the provision of such earth moving machinery and labour as was available during the war years, old sleeper tracks, mining and coach roads were opened up and improved to the extent of some 200 miles a year.

Concurrently, fire spotting towers were erected across the area linked by over two hundred miles of Forests Commission telephone line. It was practicable for tower men in Cann Valley to check smoke sightings with towers in Orbost, Nowa Nowa and Bruthen areas.

During post-war reconstruction, earth-moving plant became more readily available and the labour force increased to more than seventy men. Up to fifty miles of roads on entirely new alignments and across difficult forest terrain were completed each year. With the introduction of four-wheel-drive vehicles after 1946 the roading plan was amplified by the inclusion of a system of bulldozer constructed 'jeep' tracks which provided for rapid transport of crews to fires in remote areas.

Forestry operations have provided employment for many years for at least fifty residents of sixteen settlements in and adjoining the region. As well as roads and tracks constructed by the Forests Commission for fire protection, logging units have been closely roaded by the sawmilling industry for log extraction. Within the forested area there are now more than 5,000 miles of vehicular access track and a considerable further mileage of abandoned track that can be opened quickly for use in a fire emergency.

Although roading intensity is high within the vicinity of settlements, main through roads and logging areas, there are remote areas into which access is still being developed. Construction of further access, to permit rapid movement of fire crews, will for some years be a feature of Commission developmental work in East Gippsland.

(b) Management and Silviculture

As previously indicated, the forest of a large part of the region has become decadent through excessive firing, overstocking, and where selective felling had been practised, through increase in the proportion of defective trees in the crop.

The primary objectives of management must be the replacement of decadent and unhealthy stands with vigorous forest of maximum productivity, yielding highest quality mill logs, round timbers and special construction timbers, while preserving site factors and stream flow characteristics.

Rehabilitation of the forest requires the removal of all unproductive trees as well as those yielding merchantable logs, and the establishment of regeneration with a regular distribution of age classes.

Logging operations are closely supervised by forest officers to ensure the felling of all trees likely to yield logs suitable for milling. Since 1954 the felling of doubtful trees has been encouraged by the Forests Commission, by payment for the felling of specified trees which subsequently failed to yield a merchantable log. Millers requiring logs in addition to their normal allocation are permitted to 'scavenge' for logs from trees remaining on areas that are considered completely cut-over. Mobile benches too, have been used in the forest, to saw sleepers from trees left standing after logging operations have been completed.

In spite of close utilization a high proportion of the original forest remains on most cut-over areas and impedes the development of regeneration.

(c) Organization of Sawmilling

Before 1939 it was usual for a sawmill to be located close to, or within, the forest from which logs were obtained. Mill workers, and often their families, resided at the mill and where the labour force was large some facilities such as school and post office were also established. When accessible mill logs were utilized, the mill shifted to another part of the forest or to another area. The living conditions of mill workers were primitive and lacking amenities. Adjoining communities derived little lasting benefit from the temporary operation of the mill.

The destruction of mills and loss of life in the bush fires of 1939 necessitated that in future mills be located outside the forest, and that fire protection safeguards be implemented to protect life and property. The development of machinery for roading into forest stands and the cartage of logs for a considerable distance permitted the sawmilling industry to be organized to the benefit of the employer, the employees and the rural communities.

The utilization plan implemented by the Forests Commission for the East Gippsland forests defined Logging Units from which saw-millers were granted annual allocations of logs. The plan specified the locations at which the logs were to be converted. The log resource of the Logging Units was sufficient to permit the saw-millers to install efficient plants and provide comfortable housing for employees. This arrangement has proved of benefit to townships in the region, as increased population has resulted in better services.

For the mill worker and his family it has provided social, educational and recreational facilities previously limited or remote. It has enabled the employer to stabilize his work force by being able to provide better living conditions in relatively remote areas.

The grouping of mills in Conversion Centres has permitted the development of fire protection plans to safeguard settlements from external fires and to isolate fires originating within settlements. The sawmillers undertake to take part in suppression

of forest fires and their labour force has played a significant part in these operations.

Contribution of the Timber Industry to East Gippsland and Future Trends

Establishment of the sawmilling industry has resulted in significant development in East Gippsland over the past twenty years. The industry at present employs 688 men in felling, milling and transport of forest produce. Another 70 men are engaged in the sleeper industry, forestry operations employ 65 men and Forests Commission supervision and administration employ an additional 28 men. The income of more than 800 persons, some 15 per cent of the population, is derived from forest utilization, and contributes to the economy of the region.

Sawmillers' housing for employees totals 260 at present and a further 126 huts are available for accommodation of single men. The location of mill employees and families in the small townships has often necessitated improvement of communication, educational and recreational facilities. This improvement has been most marked in Cabbage Tree Creek, Cann River and Club Terrace (See Appendix 1). Although sawmillers provide accommodation for 50 per cent of the work force, this is a lower ratio than was housed fifteen years ago, indicating that some employees have obtained their own homes and have become permanent residents of the region.

Furthermore, logging contractors have obtained undeveloped land and brought it into production, by utilizing their plant for clearing at times when the plant would otherwise be idle.

Additional mills with an allocated log intake of 17 million s.ft H.L.V. are projected for construction at Orbost (1), Combienbar (1), and Cann Valley (3). Total log allocation from the forests of the region will then be 136 million s.ft H.L.V. per annum.

In the procurement of 107 million s.ft of mill logs during the past year sawmillers cut over a total area of 17,200 acres of forest. The yield from each acre was in the order of 6,000 s.ft H.L.V. Although some areas yielded a greater volume, in general there is up to five times this volume remaining in trees not suitable for mill logs. Hence, although portion of the site can be regenerated, this large residue must be removed before the forest area can be brought into full production.

East Gippsland is outside the economic range for supply of the residue to established wood pulp industries, but the wood pulp industries of Japan, together with Australian timber companies are investigating the possibility of obtaining this material for export as chips to Japan. To make this operation economic would require the production of 300,000 tons of chips per year for a period of 10 years. This is the equivalent of logging some 100 million s.ft H.L.V. and would require the employment of at least 300 men during the period. A programme of utilization on this scale would be welcomed to dispose of milling and logging residues and to remove from the forest material not at present marketable. As well as providing substantial silvicultural improvement to the forest, the project could result in further impetus to the economic development of the region.

Appendix 1

Expansion of Sawmill Employment and Housing 1952-1967

	1952—34 Sawmills			1967—43 Sawmills		
	Employees	Accommodation		Employees	Accommodation	
		Houses	Huts		Houses	Huts
Bemm River	—	—	—	30	9	14
Bendoc	33	5	8	57	7	12
(Delegate N.S.W.)	—	—	—	—	7	3
Bonang	15	3	1	13	6	3
Buchan	15	4	3	29	16	6
Cabbage Tree Creek	95	52	24	110	57	7
Cann River	16	2	—	73	42	24
Club Terrace	50	5	9	82	13	30
Combienbar	—	—	—	(Under Construction)		
Gelantipy	12	3	4	16	10	4
Genoa	—	—	—	4	—	—
Goongerah	—	—	—	20	5	8
Maramingo Creek	—	—	—	5	1	—
Martins Creek	7	1	—	—	—	—
Murrungowar	6	2	2	—	—	—
Noorinbee North	—	—	—	8	3	1
Nowa Nowa	38	4	2	79	8	2
(Lakes Entrance)					7	—
Orbost } Newmerella }	102	40	13	92	63	3
Sardine Creek	—	—	—	25	5	8
Waygara	63	2	10	45	1	1
	452	123	76	688	260	126

9

Agriculture in East Gippsland

By the Late F. R. Drake

District Agricultural Officer, Bairnsdale, Victoria

Agriculturally, parts of East Gippsland are some of the least developed in Victoria. I refer to the region E. of Lakes Entrance, including the Shire of Orbost and the greater part of the Shire of Tambo, and it is this region I shall discuss.

The total area is around three million acres, of which 690,000 acres or 23 per cent are described as occupied for agricultural purposes. However, this area includes wide Crown leasehold, much of it timbered and used only for extensive grazing purposes. The area privately owned and used for more or less intensive farming is estimated as being about 400,000 acres, or only 13 per cent of the total.

Much of the terrain is rugged and rough, and most of it heavily timbered. There are, however, some quite large areas of Crown Land which could be developed for agricultural purposes, but at high cost. At the same time alternative land use, such as reserves for forestry, flora and fauna, watershed management and so on, should be given full consideration.

Most of the agricultural settlement is found in two main areas: to the W. a substantial area surrounding Buchan and extending northwards into the higher plateau country including Gelantipy and Wulgulmerang; and the second large area comprising the river flats, coastal plains and adjoining cleared foothills around Orbost.

There are other areas, mainly of river flat and foothill country, scattered from Lakes Entrance to Mallacoota, with a northerly extension along the Cann River, and also more isolated inland settlements at Bendoc, Bonang and along the Deddick River (Tubbut).

Practically all of this country has an average annual rainfall of over 30 inches, except the south west corner near Lakes Entrance and a rain shadow area to the north west, including Wulgulmerang and Tubbut.

Agricultural Activities

These districts support a wide variety of agricultural activities. Grazing predominates and sheep are run for both wool and meat. Beef cattle are run throughout the settled areas and also to a limited extent on Crown leaseholds. Due to high values prevailing over recent years, fewer cattle are now being 'run in the bush'. But, with the progress in pasture improvement, increasing numbers are run on freehold country and cattle are turned off at much younger ages than was the case 20 years ago.

Dairying is largely concentrated around Orbost and Cann River with scattered farms further afield.

Approximate numbers of the different classes of livestock as at 31 March 1966 were:

Dairy cattle	26,500
Beef cattle	35,500
Sheep & Lambs	166,750

If we use a conversion ratio of 8 to 1, cattle run are equivalent to 248,000 sheep. Thus 40 per cent of the feed goes to sheep and 60 per cent to cattle.

I cannot give figures for the particular area, but for East Gippsland as a whole, stock numbers have increased substantially over the last 20 years—e.g. sheep by 73 per cent, dairy cattle by 45 per cent and beef cattle numbers have almost doubled. This indicates an overall general increase of around 75 per cent.

It is important to realize that this expansion is based almost wholly on pasture improvement and not on the bringing in of new land. Pasture improvement has been going on at an accelerating rate in recent years. It depends on the correct use of fertilizers to overcome soil deficiencies, together with the introduction of more productive species and varieties of grasses and clovers.

Soils of the Area

Apart from some very fertile river flat country, e.g. the Snowy River flats at Orbost, most of the soils of the coastal plains and adjoining foothills are of low natural fertility. All are deficient in phosphorus and most of the sandy and gravelly soils show responses to copper and molybdenum. Large areas are at least marginally deficient in copper and this can affect stock health and performance, as well as the growth of pastures.

Most of these soils have low reserves of potassium and after the initial improvement phase has been passed, applications of potash fertilizer are needed to maintain pastures at the highest level of production.

The fertilizer treatment involved is costly but the production of dry matter from a fully improved pasture can be 6 to 10 times that from a native pasture.

Soils of exceptionally low fertility occur on the 'grass tree' (*Xanthorrhoea* spp.) plains which occur quite extensively E. of Marlo. The soil supporting the grass tree association is a strongly acid dark grey sand with much organic matter and with a pronounced organic hard pan at a depth usually between 1 and 2 ft. The 'plains' are usually treeless and have attracted attention because of the assumed low cost of development.

Work carried out in the area showed these soils to have a very high manurial requirement. The following figures indicate the magnitude of the responses obtained on an area cultivated and sown with a pasture mixture in 1953.

Treatment	Yield
No fertilizer	Nil
Superphosphate 5 cwt	3 tons
Super 5 cwt + Agricultural lime 20 cwt	4·9 tons
Super 5 cwt + lime 20 cwt + Muriate of potash 1 cwt	7·8 tons

Fertilizers = cwt per acre; Yields = tons green herbage per acre.

Lime applied broadcast prior to sowing is fundamental to pasture establishment on these soils and adds greatly to the cost. Even when their manurial requirements are fully met pasture growth is limited by bad physical characters. They become water-logged in wet periods and dry out quickly in summer.

Most of the soils in the agriculturally developed inland areas are derived from igneous rocks or limestone deposits. They are of higher fertility, but all respond to phosphate fertilizers and some of the grey basalt soils have shown responses to potassium and molybdenum. However at this stage at least the need to use fertilizers other than superphosphate is unusual.

Of interest is the widespread shortage of sulphur in these inland soils. Sulphur

deficient pastures are typically yellow, and clover growth is restricted. While sulphur requirements are adequately supplied by the normal applications of superphosphate, experiments have shown a very poor response to sulphur-free concentrated phosphate fertilizers. These are now being manufactured in Victoria but our work has shown that they should not be used for topdressing pastures in East Gippsland.

Summer Crop Zone

The coastal region has long been known as a summer crop zone. This is based on its mild weather, long frost-free period and relatively high summer incidence of rainfall.

However the actual area devoted to crop is quite small compared with the area under pasture and in 1965/66 was only 6,500 acres—about 1 per cent of the total area occupied. The two principal crops are maize and beans, the proportional amounts grown depending mainly on likely financial returns. At present bean acreage is going up and maize down.

Last summer the area of maize was 900 acres and of beans 2,000 including 1,000 acres green beans for processing, 700 acres for seed and 300 for dry culinary beans. The latter are special varieties which are allowed to mature and are harvested dry. They are used for the grocery trade.

The bean crop has been subject to much loss from disease. This is being overcome by a system of certification of seed from disease-free crops and by spraying for disease control.

Demand for green beans for processing—canning and quick freezing—is rising. Improved husbandry methods including chemical weed control, effective disease control and the wider use of irrigation are resulting in much higher yields. Most crops both dry and green are now machine harvested.

The bean crop is certain to become of greater economic importance but the area of suitable land is limited, and agricultural expansion will continue to depend mainly on development of the pastoral industries.

Future Development

Recent studies have indicated that further doubling of stock numbers on the area already cleared is quite feasible simply by applying present knowledge of pasture improvement methods. I believe first consideration should be given to this method before additional land is cleared.

However further clearing of timbered Crown Lands is certain to proceed and it is important that such development should be done in the most effective and economical way possible.

Experience of Crown Land settlement since the last war has been quite unsatisfactory. Blocks have been allocated to individuals with inadequate knowledge and finance, and the failure rate has been high. Costs are continuing to rise and a high degree of skill and experience is needed for this work.

To investigate costs and methods a pilot farm area of 300 acres of typical medium forest land at Tostaree was developed. The work was directed by a committee representing the Departments of Lands, Agriculture, Forests and Rural Finance and Settlement Commission. Work commenced in 1962 and sowing down to pasture was completed in 1966.

Highly productive pastures were established but the cost was high: around $150 per acre, made up roughly by clearing and burning $100, cultivation $20, seed and fertilizer $15, water supply and fencing $15.

Clearing costs could be reduced by large scale operation and the use of larger machinery, but an all-up cost of less than $120 per acre would be unlikely for similar country.

Adequate finance is therefore needed. The job is no longer one for the simple pioneer, and can be done properly only by a large organization.

Provided land preparation is adequate it cannot be too strongly stressed that correct fertilizer treatment is the key to success. If this treatment is restricted or incorrect the result is an unproductive pasture which soon reverts to fern, tussocks and scrub. This has too often been the result in the past.

If the job cannot be done properly, the land should be left alone until the needed resources are available.

Finally, any further extension of Agriculture in the Region should be approached with scientific detachment.

Conglomerate beds, Woolgulmerang. (*A. W. Howitt, 1876.*)

10

Resources of East Gippsland, Victoria
Summary of Symposium

By R. G. Downes

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The contributors to the symposium have provided an outline of our knowledge of this part of Victoria, both with respect to the potential of its natural resources and the use being made of them at present. This summary is concerned with how the information may be used to consider what can happen in the future.

A proper basis for the consideration of the future development and use of the resources of a region should recognize certain key axioms.

1. The development of the resources of a region should be considered **in relation to the whole of the resources of the State** and possibly of the Commonwealth. Too often development and use of resources is looked on in a parochial fashion. The local people want something of everything: agriculture, industry, tourism, national parks, and the ancillary developments and advantages of all these activities. Pressures of this kind often lead to mistakes and inefficient overall use of both the region itself and the total resources of a country.

2. Resource development must take into consideration the need of the whole community for **land for different purposes.** People need land for production of food, fibre and water, for industrial and urban development, for transport and communications, for recreation, and land in an unchanged state for scientific study and for the preservation of plant and animal species.

3. The needs of the community for land for different purposes may **change with time**, and some uses thought to be relatively unimportant today could be extremely valuable in the future.

4. Different types of land have different potentials for various uses; the most valuable areas are those which are eminently suitable for a number of uses. These particular areas should be retained under **flexible forms of land-use** so that changes can be made to accommodate changing needs and demands of the community.

5. As far as possible, **multiple land-use should be the objective** so that land is serving the community to its fullest possible extent.

6. Systems of land-use and management should be such that the land will continue to serve its chosen purpose and will not suffer damage or decline in productivity or usefulness. For this reason the **decisions on how land is used should be based on the ecological concept**, that imposed changes on an area of land will

be followed by other reactionary changes. There is a need to ensure that such changes will either maintain stability, or create a new stability, if the continuing usefulness of the area is to be secured.

7. The present community should not make all the decisions for future generations. Unless there is an urgent need for finally deciding the use of an area for specific purposes, there could be considerable advantage in having **areas of land for which the use is at present uncommitted.**

The East Gippsland Region, although one of the earliest to be settled in Victoria, is now one of the least populated and therefore least developed. This situation exists, not because the region is devoid of resources, but rather because of its remoteness from the major centres of population. In considering the possible planned utilization of the region, the basic axioms outlined above must be borne in mind, and at the same time consideration given to the likely needs of the State of Victoria for the use of various resources during the rest of this century.

The development of oil resources and the further development of the industrial complex just to the west of the East Gippsland Region will undoubtedly lead to an increase of population much nearer to the region than the existing metropolis of Melbourne. This could create a different kind of demand on the resources of the region in the following ways.

Agriculture in the region has been handicapped in the past. The great distance from centres of population imposes a high cost for the transport of farming needs such as fertilizers, and for the transport of produce from the region. Centres of population closer to farming areas could not only alleviate this disability, but also create an improved demand for certain high value crops, such as fruit and vegetables, in a market where the economic disadvantage due to distance is much less.

Timber resources can be expected to be subject to much greater utilization because of the demand from closer centres of population, but the availability of resources will need to be studied and their utilization planned in relation to a continuing demand, or in some circumstances as the first stage of development of land for some other purpose.

No mention has been made of the water resources of the region during the Symposium because the area, by comparison with many parts of the State, is well supplied naturally. Nevertheless the development of these resources will need to be integrated with others, to serve the best interests of the community.

The new population centres could create a much greater demand for tourism and recreational land-use and if this is so, there is a splendid opportunity to prevent haphazard development which has occurred in other parts of Victoria, and led to the partial destruction of the land for the purpose for which it is now desired.

The area has unique natural features since the climate is more akin to parts of the South Coast of New South Wales, than to the rest of Victoria. Thus there is a great opportunity to set aside areas representative of the different types of country, for ecological reference and scientific study. These could be important reference areas for judging the soundness of our man-imposed systems of land-use and management.

There appears to be no great urgency for the development of the region, and so it is an appropriate part of Victoria for proper basic studies designed so that relevant information will be available for properly planned development and utilization of the resources as the needs arise.

This presents a marvellous opportunity for a technically able modern society

to do the right thing, if only society can be convinced that there is a right way to go about the integrated development of a region. This would be a development other than the day-to-day process of succumbing to individual pressures for this or that use of the land, and the making of unilateral decisions about resource use which so often lead to waste and sometimes destruction of resources, and to economic failure.

Cliff at Maximillian Creek. (*A. W. Howitt, 1876.*)